N.A.A. BULLETIN

July
1958

In Two Sections
Section 1

The Smaller Company—

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Planning and Budgeting

•

Reporting; Foremen's Incentives

•

Inventory Measurement and Control

N.A.A. BULLETIN

Vol. XXXIX No. 11 JULY 1958

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This *Bulletin* is published monthly by the National Association of Accountants, 505 Park Ave., New York 22, N. Y. Subscription price, $10 per year. Reentered as second-class matter September 22, 19[illegible] at the Post Office, New York, N. Y., under the Act of March 3, 1879.

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N.A.A. BULLETIN, Formerly N.A.C.A. BULLETIN, Vol. XXXIX, No. 11, July, 1958
Founded 1919 as THE NATIONAL ASSOCIATION OF COST ACCOUNTANTS

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Prologue

ONCE UPON A TIME, not so long ago, this story took place at the XYZ Manufacturing Company. It is a true story, at least in its essential details, and it happened in a way which is remindful of a court proceeding. The scene of our drama is, therefore, laid in a court room. The presiding judge is the president of the company. The defendant is the controller and the plaintiff is the works manager. The point of law is whether the defendant has provided satisfactory labor controls and departmental budgets. The proceedings are covered in two scenes. The cast of characters is the same throughout. The court has just been convened. Action starts with the judge asking the clerk to read the charge.

SCENE I

JUDGE: Will the clerk please read the charge?

CLERK: The plaintiff charges that the lack of initiative on the part of the XYZ Manufacturing Company's accounting department, represented by the Defendant, has caused ineffectual information to be furnished to the manufacturing division and is, accordingly, responsible for ineffectual and costly shop operations.

JUDGE: Mr. Plaintiff, this is a very serious charge. Will you please enlarge on your accusations.

PLAINTIFF: Your Honor, it is our contention that the defendant has failed to furnish these two things:

1. Effective daily labor reports
2. Departmental budgets

Because of this failure the manufacturing division lacks the essential control tools to carry out an efficient manufacturing operation. The only way this condition can be corrected is by placing in the hands of departmental foremen and manufacturing management the proper information, so that they can get

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to the bottom of the problems. There absolutely has to be a means to pin point labor inefficiency right down at the worker level, as well as some method for budgeting and controlling all indirect departmental labor and expenses.

JUDGE: Mr. Defendant, how do you plead to this charge?

DEFENDANT: Not guilty, Your Honor!

PLAINTIFF: Not guilty—why this is ridiculous! You have admitted that these controls are not being furnished by your department, so how can you deny this charge at this juncture?

DEFENDANT: Your Honor, may I explain my not guilty plea? I do not claim that the controls which the plaintiff has requested are now being furnished to him. However, I do most earnestly deny that this is the result of lack of initiative on the part of the accounting department. The plaintiff fully understands why these controls have not been furnished to him. The plain and simple truth is that he is a very impatient man which, as far as I am concerned, is the only real reason for this case being called today.

JUDGE: He may be an impatient man, Mr. Defendant, but there is also another very good reason why this case has been called. I happen also to be familiar with this company's operation and I want both of you gentlemen to understand one thing right now. The existence of the XYZ Manufacturing Company depends upon the realization of profits. Shop inefficiencies certainly cannot be tolerated, as we all know how they affect the profit picture. So, I say, Mr. Defendant and Mr. Plaintiff, that the real reason this case has been called is to determine what can be done to improve profits. Proceed with your explanation, Mr. Defendant.

DEFENDANT: As you know, Your Honor, the XYZ Manufacturing Company has quadrupled in size during the past four years. Because of the rapid growth of our company, the old systems, both in the shop and in the office, have become obsolete. Why, Your Honor, we have even had manual paperwork systems designed during this period, that became obsolete before they could become completely installed. In short, the accounting department, using any kind of manual office and paperwork routines, has found it impossible to keep pace with our company's growth. Recognizing this predicament we have developed a plan which I would like to present to you at this time.

JUDGE: Excellent. Please proceed.

DEFENDANT: In order to deal with this problem, Your Honor, we placed an

order almost a year ago for tabulating equipment on which we expect delivery within the next thirty days. During the interim, we have been reviewing all of our procedures and have prepared programs to mechanize our systems.

JUDGE: How do these programs tie in with the plaintiff's charges?

DEFENDANT: Very well, Your Honor. For the immediate future, we are going to proceed with daily direct and indirect labor distribution and departmental indirect labor and expense budgeting. Ultimately, however, we intend to use this equipment on many other applications, such as payroll, billing, accounts payable, standard costs, engineering bills of material, and even in production control.

PLAINTIFF: I appreciate all this fine conversation, Your Honor, but I would like the defendant to be a little more specific as to just how the accounting department intends to furnish all this information.

DEFENDANT: In anticipation of this request, Your Honor, the accounting department has prepared a series of exhibits which I would like to present at this time. These exhibits will demonstrate the type of report we will be able to furnish to the manufacturing division as soon as the trial and error period of installation is completed.

JUDGE: I take it that these exhibits will show what the XYZ Manufacturing Company can do to eliminate labor and expense inefficiencies and help accomplish the desired profit picture?

DEFENDANT: Yes, Your Honor, they will do just that. In considering our systems revision, we started by examining our present chart of accounts. I am sorry to say we found it inadequate. Accordingly, we prepared a new chart of accounts which I would now like to introduce as Exhibit A.

The numbering system used in this new chart of accounts is built around a five-digit number. The first digit represents the major division in the overall system. You will notice that 1 indicates assets, 2 indicates liabilities and capital, while 3 through 9 are all profit and loss accounts. For accounts beginning with 1, 2, 3, 4, 5 and 9, the remaining four digits indicate subdivisions of the basic classifications. For accounts beginning with 6, 7, and 8, the first digit plus the next two represent the department number. For example, 602.00 indicates the crankshaft department, while 801.00 represents tool engineering. In the 600, 700 and 800 series of accounts, the last two digits after the decimal indicate the type of expense. For example, 602.15 represents setup labor in crankshaft, while 801.50 indicates general supplies in tool engineering.

PLAINTIFF: Please, Your Honor. This sounds rather complicated to me. Remember we need information that can be interpreted and used on a foreman level. That's where real labor and expense control has to take place.

DEFENDANT: I am sure you will find the five-digit system I have been describing will do that. We will require a system of this sort, since the same type of expense will occur in several departments and identification must be positive to enable us to assign charges to the responsible department. In this respect, Your Honor, we believe expenses charged to departments must be strictly on a responsibility basis. In other words, only charge a foreman with expenses he can truly control. I believe the remainder of Exhibit A is self explanatory.

CHART OF ACCOUNTS

Major Divisions		Departments	
100. 00	Assets	601. 00	Automatics
200. 00	Liabilities & Capital	602. 00	Crankshaft Machining
300. 00	Operating Revenue	603. 00	Turret Lathes
400. 00	Manufacturing Variances	" "	"
500. 00	Fixed Burden	701. 00	Purchasing
600. 00	Direct Manufacturing Departments	710. 00	Industrial Engineering
700. 00	Service Departments	" "	"
800. 00	Other Operating Departments	801. 00	Tool Engineering
900. 00	Other Income & Expense	811. 00	Engineering Design
		821. 00	General Sales
		831. 00	General & Administration

Accounts

Salaried accounts	.01 through .05	Materials - Supplies & Other Operating Costs	.40 through .99
Hourly accounts	.06 through. 33		
Premium & Added Payroll	.34 through .38		

Exhibit A

JUDGE: Not quite, Mr. Defendant. I'm not sure I understand what you mean by manufacturing variances and fixed burden.

DEFENDANT: Well, Your Honor, as both you gentlemen know, a standard cost system has already been installed at the XYZ Manufacturing Company. It is our belief that the variances disclosed by this system deserve top management attention and, accordingly, we plan to report labor performance, labor rate, and purchase price variances separately. Manufacturing scrap will also be included in manufacturing variances because, here again, is a cost which deserves top management action. The fixed burden series of accounts is designed to provide our management with an analysis of depreciation, insurance, taxes and rental expenses. This information is very important because these expenses are of a constant nature and will not be subject to volume fluctuations.

PLAINTIFF: Words, words, words! What I want to know is how you are going

to assemble this daily labor information and if it will be in a useable form for the department foreman.

JUDGE: Just a minute, this sounds like a very logical and organized approach to the problem. Please continue, Mr. Defendant.

DEFENDANT: Thank you, Your Honor. As I mentioned before, we have already installed a standard cost system at our company. In other words, our direct labor operations have been measured and costed on a standard basis. Now, by tying in with these established standards, we are able to introduce daily labor control into the shop. This, Mr. Plaintiff, is what I am sure you have been looking for—a means for establishing individual worker performance efficiency. I would now like to introduce Exhibit B.

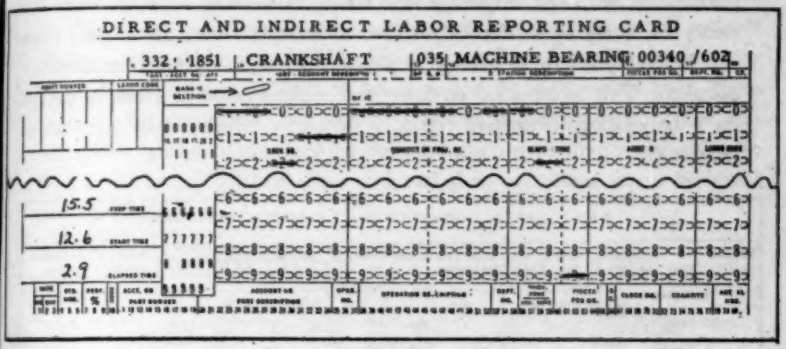

Exhibit B

This, as you can see, is a direct and indirect labor reporting card. The card has been designed to cover all types of labor reported from the shop. For every labor operation or indirect labor account which we might use in the shop, a supply of these cards will be kept at one of our central timekeeping stations. These cards will be pre-punched containing the part or account number and description, the operation number and description, the standard pieces per hour and the department number in which the work occurs. If the labor is performed on other than direct or indirect work, such as maintenance job orders, or asset construction, the card is also designed to accommodate that information. When an operator goes on a job, he will report to one of three central timekeeping stations. The timekeeper will remove the appropriate labor card from his files and will mark-sense on it the clock number of the operator starting on this work. When the work is completed, the operator will report back to the timekeeper who will mark-sense on the

card the quantity produced as well as the elapsed time. These cards will be turned into the accounting department daily and will become the basis for the labor control reports.

PLAINTIFF: Hurry up and get to the point. What do these reports look like?

DEFENDANT: See what I mean, Your Honor, about the plaintiff being an impatient man? I will get to the reports shortly. After the labor cards are received in the office, the reports will be produced almost automatically. The cards will be processed through a machine which reads the pencil marks (mark-sensing) and punches into the card the information represented by these marks. These cards will then be run through an electronic calculating machine which will compute the elapsed standard hours and compare this information with the elapsed actual hours, calculating a performance efficiency for every operation. In the case of indirect labor, the elapsed hours will be multiplied by an average departmental rate, using the same electronic calculator. This information on direct and indirect labor will then be printed on a daily labor distribution report, a sample of which I now introduce as Exhibit C.

DAILY LABOR DISTRIBUTION XYZ MANUFACTURING COMPANY

Date March 3, 1958

Account Part No.	Part Description	Oper. No.	Oper. Description	Dept. No.	Clock No.	Direct Labor Quan.	Act. Hrs.	Std. Hrs.	% Perf.	Std. Pcs. Per Hr.	Ind. Labor Act. Hrs.
6	Supervision			602	113						1.0
15	Setup			602	191						7.5
17	Rework			602	23						4.4
332-1851	Crankshaft 6Shp	050	Turn 15° Angle	602	545	210	5.0	3.5	60	60.0	
332-1851	Crankshaft 6Shp	060	Finish Turn	602	310	122	3.5	3.8	109	32.0	

OPERATOR EFFICIENCY

Exhibit C

You will note that this report is prepared for a specific department and that it contains a performance efficiency percentage on every operation performed in that department the preceding day. At the beginning of the report, it shows all indirect labor charged within that department during the same day, as well as any maintenance labor or asset construction labor. Exhibit C will be run in the accounting department each morning for the previous day. This report will be run in two ways, first, by part number within department and, second, by operator's clock number. By 9 o'clock in the morning, these reports will be in the hands of every departmental foreman for analysis of the previous day's work.

PLAINTIFF: This is more like it, Your Honor. The sooner we can get these reports to our foremen the better. They will really be able to use this information to correct individual worker inefficiencies. As you know, we have no performance efficiency measurements at the present time, but it would be my estimate that, right now, the shop average performance against standard doesn't exceed 65 per cent, and I for one won't rest until we change that to at least 95 per cent.

JUDGE: I agree with you, Mr. Plaintiff. This information should be of real value to the department foremen. But what about management, isn't there some way this same information can be supplied to them on a summary basis so they can see the overall picture?

DEFENDANT: Yes, Your Honor, there certainly is, and that brings us to Exhibit D. This report is for management and summarizes direct labor performance efficiency on a daily and monthly basis for all manufacturing departments. It also develops the actual indirect hours on a daily and monthly basis. These indirect labor percentages can then be reviewed by management against predetermined budget percentages for the production departments and will give them a day-to-day quick analysis of actual shop operations versus budgeted shop operations.

X Y Z MANUFACTURING COMPANY PRODUCTION DEPARTMENT DAILY PERFORMANCE

Date 3/9/58

	DIRECT LABOR						INDIRECT LABOR				
	Daily			Month to Date			Daily		Month to Date		Budget
	Actual Hours	Std. Hours	Perf. %	Actual Hours	Std. Hours	Perf. %	Actual Hours	Actual %	Actual Hours	Actual %	
601 Automatics	51.0	18.4	36.3	279.2	151.3	54.2	5.0	26.9	29.0	19.2	8.5
602 Crankshaft	139.5	127.7	91.5	704.8	615.9	87.4	33.1	25.9	164.3	26.7	18.7
610 Blocks	288.9	257.1	89.0	1480.0	1331.2	89.9	94.8	36.9	451.4	33.9	28.3
611 Heat Treat	10.0	10.4	104.0	66.9	64.7	96.7	14.0	134.6	69.5	107.4	42.8
Machining Total	1286.8	1192.1	92.6	6250.0	5527.0	88.4	391.3	32.8	2044.6	37.0	22.3
Grand Total	2063.3	1952.5	94.6	10527.4	9538.3	90.6	860.0	43.0	3924.3	41.1	24.5

DIRECT LABOR EFFICIENCY

INDIRECT LABOR COMPARISON

Exhibit D

PLAINTIFF: I must admit this sounds like the type of information that is so badly needed. But what about budgets? I notice you made reference to budgeted allowances. Are you planning to furnish some sort of budget analysis or budget report which will give a detailed operating picture?

DEFENDANT: We certainly are. This brings me to my final report, Exhibit E. It is our intention that this should be a monthly report prepared in detail for every manufacturing and indirect department, completely detailing all

DEPARTMENTAL BUDGET REPORT

Crankshaft Department — X Y Z MANUFACTURING COMPANY — Date March 1958

CURRENT MONTH		YEAR TO DATE	
Standard Direct Labor	6948.20	Standard Direct Labor	37096.38
Performance Variance	452.50	Performance Variance	2335.24
Total	7400.70	Total	39431.62

Account Description	Account Number	Current Month Budget	Current Month Actual	Current Month Over/Under	Year to Date Budget	Year to Date Actual	Year to Date Over/Under
Supervision	602.06	215.41	166.50	48.91cr	1149.99	937.98	212.04cr
Production Downtime	602.14	41.69	14.87	26.82cr	222.57	206.22	16.35cr
Shift Differential	602.34	222.36	233.89	11.53	1187.07	953.34	433.73cr
Overtime Premium	602.35	382.19	2.89	379.30cr	2040.31	263.11	1777.20cr
Total Indirect Labor and Payroll Added		3064.44	3072.93	8.49	16359.51	17286.12	926.61
Abrasives	602.40	625.40	12.69	612.71cr	3338.70	2731.83	606.87cr
Expendable Tools	602.47	1118.77	2343.91	1225.14	5972.55	9089.23	3116.68
Processing Material	602.61					16.02	16.02
Total Material Cost		2070.77	2666.59	595.82	11054.79	13466.76	2411.97
Total Cost		5135.21	5739.52	604.31	27414.30	30752.88	3338.58

Exhibit E

indirect labor, payroll added or fringe benefits, and material and supplies accounts. Exhibit E is intended to serve two purposes. Besides being an operating budget, it is also designed to serve as a completely itemized factory ledger. By this simple means, we will be able to eliminate the tedious labor and expense account postings so traditional to general ledger accounting. It is our plan that all budgets will be prepared one year in advance. Within the 600 series, or the manufacturing departments, we plan to operate a variable budget program based on budgeted direct labor.

JUDGE: Just a minute, Mr. Defendant. Would you please explain what you mean by a variable budget?

DEFENDANT: As the wording implies, Your Honor, the budget program for the manufacturing, or direct labor, departments would be on a variable or flexible basis, changing with the varying levels of manufacturing volume. The proper basis for this program is direct product labor. In other words, we will obtain budgeted percentage allowances by dividing estimated indirect labor expenses by estimated direct labor for a given department. Each month we will apply these budgeted percentage allowances to actual direct labor totals and compute a dollar budget allowance for that month. These budget allowances will then be compared against actual indirect labor, giving us an over and under budget dollar comparison for the month and year to date.

PLAINTIFF: I think your approach in handling indirect labor on a variable basis is correct. But what about the other departmental expenses, such as fringe benefits and material and supplies? How do you plan to handle them?

DEFENDANT: As in the case of indirect labor, predetermined budget percentages will apply against the actual direct labor dollars and will give us a budget

dollar allowance which will be compared to the actual expenses incurred during that period. The actual expenses or accruals for the fringe benefit accounts will be based on calculations made in the cost accounting section. Cost accounting will furnish this data to tabulating for key-punching and inclusion in the budget report. The material and supplies actual expenses will be based on distribution cards, key-punched from account classifications entered on material and expense invoices as processed through our general accounting department.

JUDGE: If I understand you correctly, Mr. Defendant, the variable procedure you have just described applies to the manufacturing departments. This is all well and good, but don't forget there are a lot of non-manufacturing departments in the XYZ Manufacturing Company. What kind of a budget program can you set up for them?

DEFENDANT: Well, Your Honor, in the other departments such as purchasing, production control, industrial engineering, engineering, sales and general and administration, we plan to operate a fixed budget because their activities and expenses are not directly related to production, as was true for the manufacturing departments. They will be budgeted on a yearly basis, and the monthly budget reports will be a comparison of actual expenses within these departments against the prorated yearly budgets. Detailed reports will be prepared for all departments, as will summary reports by major divisions which will tie in with the control accounts contained within our chart of accounts.

By way of summarizing, Your Honor, I would like to state that, while we have these programs completely planned, just as I have described them to you, we still have ahead of us a very difficult installation period. With that thought in mind, I would like to ask a stay of judgment of six months, during which time our equipment will arrive and we will have the opportunity to put these programs into effect.

JUDGE: I feel this is an entirely fair proposal. How do you feel about this, Mr. Plaintiff?

PLAINTIFF: I am in complete agreement, Your Honor, and I would like to add that, if this program turns out to be just half as good as it sounds, I can see here the basis of really effective expense control for the XYZ Manufacturing Company.

JUDGE: This case is adjourned for six months, at which time we will reconvene to hear a progress report on the programs as outlined by the defendant.

SCENE II

Action takes place in the same courtroom, same characters, six months later. The judge has just reviewed the charge, then asks the defendant, controller of XYZ Manufacturing Company, to make a progress report on the reporting program he had outlined in the court in Scene I.

DEFENDANT: Your Honor, the tabulating equipment required for the program arrived about 30 days after the last hearing. Immediately the accounting department started installation work and—

PLAINTIFF: Your Honor, may I please interrupt? At the moment I am not being impatient, it's just that, because I was responsible for this case being started in the first place; I feel I should also be responsible for seeing that it properly ends.

JUDGE: Proceed.

PLAINTIFF: Six months ago we met in this same courtroom to consider the manufacturing division's charge against the accounting department. At that time, the defendant outlined a course of action that he proposed to follow on receipt by our company of tabulating equipment. Your Honor, the past six months have been quite an experience. The equipment arrived approximately on schedule. There followed a very hectic ninety-day period during which the various procedures and reports were being installed. Approximately sixty days ago, things seemed to straighten out and I am happy to state that the manufacturing division is now receiving the desired reports. All indications lead me to believe that the results are going to be very satisfactory. As a matter of fact, Your Honor, when these daily labor reports were first produced, it developed that the overall shop performance efficiency was at the 70 per cent level. During the last two months, though, the foremen and the workers have been able to bring this up to 90 per cent so you can see how much this information was needed and what good use is being made of it.

And, Your Honor, the interest that has resulted from the departmental budgets is unbelievable. Our formen have actually set up a competition, based on budget savings, between our machining and assembly sections. I must admit that, when the defendant first talked about responsibility budgeting, it was all a little vague to me. Now, however, I know what he means, as the foremen are really watching the expenses charged to their departments. This is exactly what we wanted to happen, because expense control and reduction at the departmental level will mean a lower overhead, and will bring about increased profits.

JUDGE: I take it, then, that you are satisfied with the results to date?

PLAINTIFF: Yes, Your Honor, I am. In fact, I would like to withdraw the charge because it has been effectively demonstrated to me that, within a very short period of time, we will not only have all the reports and controls that I originally desired but also that they will be operating in such a manner and producing results beyond anything I had hoped for. I would also like to state publicly here today that this case has certainly taught me the meaning of the old adage, "Patience is a virtue."

JUDGE: These results are certainly gratifying. Would you care to comment, Mr. Defendant?

DEFENDANT: No comment!

JUDGE: Case dismissed.

CASH OR CHECK PAYROLL — AN OLD QUESTION RECURS

by V. J. Svendsen*

I HAVE READ, WITH MUCH INTEREST, the procedure used by the American Optical Company as described in "A Cash Payroll Without Coins," by Raymond Voght in the *N.A.A. Bulletin* for April 1958. Considering the fact that the company has 3,500 employees, the coin handling was undoubtedly a time-consuming task. The method of solving it was certainly unique. However, it brought to my mind a question. How many small and medium sized plants, or any other type of business enterprise, still pay by cash?

This becomes an interesting point for several reasons. First and foremost is, of course, the added hazard of burglary. A cash payroll for 3,500 people is a most tempting morsel for a person or persons so inclined. For a number of years, law enforcement agencies have been aggressive in their efforts to convince management and labor of the increased risk entailed by the use of cash for payroll payments. I do not have the statistics at hand but I believe that payroll "holdups" constitute a large, perhaps a major, percentage of all types of burglary. They are more common in the larger cities, of course.

Many times cash payments are a part of the union contract but I am sure the majority of unions are willing to listen to reason on the point. Adequate means can be arranged to facilitate the cashing of checks, should it be necessary. Many banks are opening additional branches, which is of great assistance. Some are opening one night a week for better customer service. I believe a survey of grocery stores and supermarkets would indicate a cooperative attitude toward check cashing. More recently, armored truck firms are cashing checks directly from vehicles especially prepared, for a very nominal fee. You can stop payment on a lost or stolen check, but cash lost is, usually, gone forever!

The other objection to a cash payroll is the time required to make up and distribute it. There is the necessity for obtaining a signature from each employee when distributing cash, which consumes not only the paymaster's time but productive time as well, depending upon the time of day the payroll is delivered to the employee. In a check payment plan, payroll work is normally completed when computations are finished, since the check is a part of the system. Thus the time utilized in the other necessary steps involved in cash payments is a cost which could be recovered. Distribution of checks is a simple process which does not consume much time.

Undoubtedly there are some situations which it is necessary to pay by cash, possibly due to the location of the plant, inadequate facilities for cashing checks, etc. However, I believe these would be the exception rather than the rule. Check payment has its problems, too. I refer primarily to the check reconciliation necessary in such a procedure. However, in the final analysis, the check payment is, in my opinion, the more desirable for both the employee and the company.

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* Accounting Supervisor, Aerovox Corp., New Bedford, Mass.

Using Stratification to Measure Inventory Effectiveness

by F. C. GOSEWISCH

IT IS A VERY SIMPLE OPERATION to compute the inventory turnover for a business, because financial statements provide both an inventory and cost of sales figure, and this computation has become a standard practice. The turnover ratio is considered to be a yardstick by which the inventory policy (or the implementation of that policy) can be measured. However, the determination of the inventory value or the ratio of that value to cost of sales does not answer management's question: "How effective is the present inventory to meet the future demands to be placed on it?"

Turnover vs. Stratification

The use of the turnover ratio as a measuring device can be misleading in many instances. To compute a turnover ratio, "the investment sold" or "cost of sales" is divided by the investment, but the inventory investment sold usually includes such values as write offs, which are not sales; the two figures may not be computed on the same cost basis; and in computing investment the "book" value is generally used, instead of the total amount of capital investment in inventory. Even if a company were to compute its investment in inventory and investment sold on the same basis, and eliminate the fictions that are frequently inserted in the computation of either or both of the figures, management's question has not been answered for, at year end, the inventory is being weighed against the past year's business, when the purpose for which it is held is to support the coming year's business. Further, the statistic produced is of a composite and, as such, can conceal many unfavorable conditions. For example, an overall turnover of four could conceivably conceal the fact that half the inventory turned eight times and the remainder did not turn at all! Another factor in the use of turnover is that it is concerned with inventory only and not commitments that will become additions to the inventory. While it might be considered that some

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future turnover computation will include the present commitments, the discovery of any errors will be made only after the damage has been done.

Stratification is an alternative method of measuring the effectiveness of an inventory and has still other merits, sufficient to justify its use as a means of controlling inventory. Stratification is defined as the comparison of one set of values against another set of values and the classification of the differences resulting from this comparison. The technique can be applied in a variety of ways, depending on the nature of the business or the nature of the questions to which answers are being sought. It is most easily employed through the use of punched cards but is capable of being performed by manual methods.

In compiling figures for the purpose of measuring the effectiveness of inventory policy by whatever method, no distinction should be made between written

STRATIFICATION DATA

PART NO.	EAU	OH + OO	SHORT	EXCESS
1	$ 300	$ 170	$ 130	$ 0
2	450	280	230	0
3	500	320	180	0
4	11	22	0	20
5	75	70	5	0
6	3,500	2,800	800	0
7	250	200	50	0
8	0	50	0	50
Etc.	Etc.	Etc.	Etc.	Etc.
Total	$150,000	$110,000	$50,000	$10,000

EXHIBIT 1

STRATIFICATION DATA - AMPLIFIED BASIS

PART NO.	REQM. OBJ. (ROI)	OH + OO	SHORT	EXCESS
1	$ 150	$ 170	$ 0	$ 20
2	250	200	50	0
3	300	320	0	20
4	10	22	0	12
5	66	70	0	4
6	4,000	2,800	1,200	0
7	100	200	0	100
8	0	50	0	50
Etc.				
Total	$100,000	$115,000	$7,500	$22,500
Shortage Factor	7.5%		Effectiveness Factor 70%	
Excess Factor	22.5%			

EXHIBIT 2

off or devalued inventory and active inventory. In the application of turnover as a means of measurement, write-offs cause higher turnover ratios, although they are evidence of inefficiency. Hence, in the conduct of a study to analyze inventory effectiveness, the entire inventory should be studied without regard for the manipulations necessary for the preparation of company reports.

A simple example of stratification technique is embodied in Exhibit 1. This particular type of report probably has a very limited application, but it demonstrates the basic procedures involved in making a stratification study. Prior to conducting this study the following data must be determined for each item:

1. Unit cost.
2. Estimated annual usage (EAU)
3. Inventory commitment. (The sum of on hand (OH) plus on order (OO).)

By extending the unit cost times the estimated annual usage and then times the

inventory commitment, a requirement value and an asset value are obtained for each item. The comparison of these values is made by subtracting the asset from the requirement and posting the positive answers in one column as shortage and the negative answers in another as excess. By totaling the columns, management is in a position to view the relationship of the total inventory commitment to the estimated yearly demands to be made on the inventory.

Simple and Less Simple Cases

One of the by-products of any stratification analysis based on the inventory commitment is obtained by learning the value of this figure. In a manufacturing organization, the inventory commitment is made up of:

1. Finished stock and raw material on hand.
2. Work in process.
3. Purchased material on order.
4. Labor and burden obligated by existing orders.

This last figure is frequently not available. When stratification is used, the figure can be obtained by subtracting the first three figures from the inventory commitment. The application of an average rate for labor and burden per hour will convert this figure into hours, which can serve as a guide in production planning or as a check against the hours estimated by the production planners.

In organizations having items with a wide range of lead times, unit costs, and usage quantities, additional information will provide a better analysis of the effectiveness of the inventory policy. Inventory objectives in such organizations are usually not the same for all items. The company may desire a greater depth of stock on the less expensive items and may attempt to hold the inventory of the more expensive parts to a minimum. In this type of study, the punched cards should contain, in addition to the factors already specified—unit cost, estimated annual usage and commitment—lead time and stockage objective, both in months. These figures are established for each item. The figures can be in weeks or days, if desired, by adjusting the number 12 in subsequent computations to 52 or 365, as necessary. Stockage objective is obtained by dividing the number twelve by the desired turnover.

In applying this method, the theoretical optimum inventory commitment or requisitioning objective is computed as the requirement value. Thus, the requisitioning objective for each item is determined as unit cost times EAU times (stockage objective plus lead time) divided by twelve. After computing the requirement value on this basis, the procedure is identical to that described in relationship to Exhibit 1.

The results of such a study are depicted in Exhibit 2. From the total figures obtained, numerical factors can be computed to indicate the effectivness of the inventory policy. By dividing the shortage by the requirement, a shortage factor is obtained; it is .075, or 7.5 per cent, in the example shown. The excess factor is determined from excess divided by requirement; it is .225 or 22.5 per cent in this case. The effectiveness factor can be computed:

$$1 - \frac{\text{Shortage} + \text{Excess}}{\text{Requirement}} \quad \text{or} \quad 1 - (\text{Shortage Factor} + \text{Excess Factor})$$

In the example shown, the effectiveness factor is .7 or 70 per cent on a scale where 100 per cent would represent a "perfect" inventory commitment. It is essential to bear in mind, when analyzing these statistics, that the effectiveness factor measures the degree of achievement of a predetermined turnover objective and that the shortage and excess factors measure the variations from that predetermined turnover objective. In the example, the results are abnormally good. A factor of 70 per cent is very high. In practice, almost every item will contribute some value to either the "shortage" or "excess." Even those items that are in balance will produce some contribution. An item costing $100, with a 3-month lead time, a 3-month stockage objective, and an estimated usage of 10 per month would have a requisitioning objective of $6000. If there are 55 on hand and on order, it would contribute $500 to shortage. With 65 on hand and on order, it would contribute $500 to excess. Yet, in neither case, is the inventory position out of line. From this it is evident that an effectiveness factor of 100 per cent is unobtainable. The maximum benefit from the use of this method of measurement is obtained by computing the factors on a regular cycle in order to identify areas requiring improvement and to reverse any unfavorable trends.

Either of the studies exhibited can be mechanically produced from the same deck of cards. Thus, if management is concerned with measuring effectiveness or requires the value of inventory in excess of one year's supply (or any other time period), the answers can be obtained by manipulation of a single deck of cards.

Keeping Implications Clear

In a manufacturing organization, the values appearing as totals in each of these columns, except the inventory commitment column, will not tie in to any accounting figures, even if devaluations are taken into account. Where manufacturing is involved, the estimated requirement value will exceed the estimated cost of sales. This is due to the assignment of unit costs which include all the

costs of the item and, therefore, the requirement values of parts used to make other parts or assemblies will be "doubled up." This does not affect the accuracy of the statistics produced, but it points up the need for careful accumulation of data. To illustrate, assume that one of the items is a casting, C-1, which can be machined into two different parts, P-1 and P-2. If the records for these items reveal statistics similar to those shown below, some of the problems are brought into focus:

Part. No	*Unit Cost*	*EAU*	*Reqn. Obj.*	*On Hand*	*On Order*	*Lead Time*	*Stockage Objective (mos.)*
C-1	$10.00	250	125	75	60	3	3
P-1	30.00	120	50	40	30	2	3
P-2	32.00	120	50	10	0	2	3

Notes: 1. The EAU for part C-1 exceeds the sum of the EAU for P-1 and P-2 to allow for scrap.

2. The lead time for parts P-1 and P-2 is established from machining requirements only and does not include the time required to obtain a stocked casting.

These items would appear on a stratification report, patterned after Exhibit 2 as follows:

Part No.	*Reqmt.*	*Asset*	*Short*	*Excess*
C-1	$1250.00	$1350.00	$ —0—	$100.00
P-1	1500.00	2100.00	—0—	600.00
P-2	1500.00	320.00	1180.00	—0—
Sub-total	$4250.00	$3770.00	$1180.00	$700.00

The requirement of $1250.00 shown for the casting is not part of the estimated cost of sales and, therefore, the total appearing in this column cannot be tied in with any budget estimate or accounting report. The asset value, however, will be a true figure if the data is properly recorded. Care must be taken to avoid a "doubling up" of assets. For instance, part P-1 shows an on-order quantity of 30 and the casting shows an on-hand of 75. Under some record keeping methods, it is possible that the on-order figure for the finished part will be recorded before the on-hand figure for the casting is reduced. If the stratification statistics are drawn off in the interim, the assets will be overstated. In this instance, it may be that 30 of the 75 castings shown as being on hand may be that part of the assets recorded as on order under Part-1. This must be avoided in the draw-off of data or the report will be incorrect.

Even though the requirement total is deliberately overstated and the asset value is computed correctly, the report is not erroneous, however odd this may

DETAILED STRATIFICATION DATA FOR OPERATIONAL DECISIONS

PART NO.	RO	SO	LTU	OH	OH:SO	OH:LTU	OH:EX	OO	OO:SO	OO:LTU	OO:EX	STG	STG:SO	STG:LTU	EX
1	150	50	100	120	50	70	0	50	0	30	20	0	0	0	20
2	250	150	100	200	150	50	0	0	0	0	0	50	0	50	0
3	300	150	150	320	150	150	20	0	0	0	0	0	0	0	20
4	10	4	6	2	2	0	0	20	2	6	12	0	0	0	12
5	60	40	20	0	0	0	0	76	40	20	16	0	0	0	16
6	4000	3000	1000	2000	2000	0	0	800	800	0	0	1200	200	1000	0
7	100	20	80	200	20	80	100	0	0	0	0	0	0	0	100
8	0	0	0	50	0	0	50	0	0	0	0	0	0	0	50
Etc.															

TOTALS	RO	$100,000	OH	$70,000	OO	$40,000	STG	$10,000	Excess
	SO	40,000	OH:SO	30,000	OO:SO	7,000	STG:SO	3,000	$20,000
	LTU	60,000	OH:STU	25,000	OO:LTU	28,000	STG:LTU	7,000	
			OH:EX	15,000	OO:EX	5,000			

Formulae

Requisitioning Objective
$RO = EAU \times \frac{SO\ (MO) + LT}{12}$

Stockage Objective (value)
$SO = EAU \times \frac{SO\ (MO)}{12}$

Lead Time Usage
$LTU = EAU \times \frac{LT}{12}$

On Hand to Meet Stockage Objective
OH:SO = lesser of: SO or OH

On Hand to Meet Lead Time Usage
OH:LTU = lesser of: OH - OH:SO or LTU

On Hand in Excess
OH:EX = OH - (OH:SO + OH:LTU)

On Order to Meet Stockage Objective
OO:SO = lesser of (SO - OH:SO) or OO

On Order to Meet Lead Time Usage
OO:LTU = lesser of (LTU - OH:LTU, or (OO - OO:SO)

On Order in Excess
OO:EX = OO - (OO:SO + OO:LTU)

Excess
EX = (OH + OO) - RO (+ answers only)

Shortage
STG = RO - (OH + OO)(+ answers only)

Shortage in Meeting Stockage Objective
STG:SO = SO - (OH:SO - OO:SO)

Shortage in Meeting Lead Time Usage
STG:LTU = (OH:LTU + OO:LTU)

Test Checks for Accuracy

SO + LTU = RO
OH:SO + OH:LTU + OH:EX = OH
OO:SO + OO:LTU + OO:EX = OO
OH:EX + OO:EX = EX
STG:SO + STG:LTU = STG
OH:SO + OO:SO + STG:SO = SO
OH:LTU + OO:LTU + STG:LTU = LTU
OH + OO - RO = EX - STG

appear at first glance. The explanation for this is somewhat complex. Requirements are computed on the basis of keeping the pipeline full, not on the basis of satisfying sales for the requisitioning objective time period, concluding that period with nothing available for sale or use in manufacture.

Situations such as the above illustration definitely complicate the use of the report as an instrument of inventory control. They do not affect the validity of the report as a device for measuring inventory effectiveness. In the illustration, if a large overstock of both P-1 and P-2 existed, there would be no shortage for ordering purposes of C-1, even if there were none on hand or on order. That is, there is no shortage which should be requisitioned. Yet, in the stratification report, the amount by which the requisitioning objective quantity exceeds any on hand and on order will be shown as a shortage. However, a sufficient quantity of C-1 must be on hand or on order or the lead time for P-1 and P-2 would be extended, increasing the requirements and reducing excess for these items. Therefore, the effectiveness factor is not altered by such manipulations. There may be some argument in support of the contention that, in such cases, the shortage factor is overstated and the excess factor understated, but the key factor of inventory effectiveness is not affected.

Another problem brought into focus by this illustration is the fact that an excess of part P-1 will not offset a deficiency of part P-2 when part C-1 is being analyzed. Here again, the effectiveness factor is unaffected but, for ordering purposes, the excess and shortage quantities cannot be used. As a general rule, for control purposes, the estimated usage for the requisitioning objective time period must be computed on the basis of the immediate conditions, not from the estimated annual usage, when determining quantities to be requisitioned. If this is done, the results will not alter the effectiveness factor. However, in order to compute requirements on this basis, a very detailed technique must be employed, and such techniques are subject matter for another discussion.

Operational Studies Require More Data

A more sophisticated approach, such as shown in Exhibit 3, will produce a set of statistics from which many operational decisions can be made. To produce such a study, the same original data is required, except that inventory commitment is stated in two figures, on hand and on order, instead of being listed as their sum. The punched card data is as follows:

Part Number	(Part No.)	Stockage Objective	
Unit Cost	(UC)	(in months)	[SO (MO)]
Estimated Annual Usage	(EAU)	On Hand	(OH)
Lead Time (in months)	(LT)	On Order	(OO)

In the computation of requirements, the requisitioning objective is recomputed as two values. The estimated annual usage is divided by the desired turnover to produce the stockage objective requirement and is then multiplied by the lead time divided by twelve to obtain the usage requirement during lead time. The sum of the stockage objective and usage during lead time will equal the requisitioning objective. At the bottom of Exhibit 3 are listed the formulas for computing each caption on the body of the report depicted, together with checks which can be made to ensure accuracy.

The analysis of a study such as this will reveal some of the areas of controlling inventory which require corrective action. The on hand in excess can be analyzed for possible surplus disposal; the on order in excess may be rescheduled, or cancelled; the on order to meet stockage objective may require expediting action; the shortage in meeting stockage objective is an area where real trouble is coming, unless ordering and expediting are undertaken at once; and the shortage in meeting lead time objective requires immediate action or trouble will arrive in the not too distant future.

The effectiveness factor can be computed from the figures produced by this study, as can the shortage and excess factors. In addition, if desired, additional percentages can be computed and watched during a series of these studies to determine whether or not the application of policies and procedures is producing the desired results. The tabulating deck used to create this study can also be used to prepare a stratification analysis on the basis of the annual requirement as depicted in Exhibit 1. It is also possible, through this technique, to estimate the on hand and on order position as of specific future dates.

A Measure of Effectiveness and Guide to Control

In considering stratification as a means of measuring inventory effectiveness, as a guide to controlling inventories, and as a way of identifying some exceptions requiring action, each management must establish the questions it wants answered and then determine from the multitude of available data, the methods of application which will produce the answers to these questions. Stratification will not only provide answers to the questions management asks; it will also define problems and identify problem areas toward which management can direct its efforts to obtain maximum efficiency.

Setting Operating Goals and Measuring Achievements

by CHESTER H. SNEIDER

IF MANAGEMENT IS TO BE ABLE to cope with the tremendous complexities of business in this unfolding age, great will be the premium on improvements in the field of measurements. The portrayal of better facts, presented in a more clear and concise manner to the management responsible for performance, will result in better and more prompt decisions. Measurements *must* be developed which can readily show the experience of the past, the trends of the present and the needs of the future.

The conventional types of measurements—operating statements and reports expressed in dollars and cents—are not always adequate to bring into focus the specific areas which are the heart of a problem and which have a significant effect on the total performance. The need for new and better ways in which to measure performance—to call attention to things which are wrong in time for corrective action to be taken—offers both a challenge and a great opportunity to show managers and supervisors just how good a job they are doing.

Objectives and Goals

The building of a new measurements program begins with the development of a set of objectives and goals by the manager or supervisor who has the responsibility for the accomplishments of a particular function. Since objectives and goals will be the backbone of our measurements program, let us pause long enough at this point to define their meaning.

Objectives are continuing aims, purposes or ends expressed in broad general terms, which will endure over a long period of time. The structure of objectives is relatively stable and will require revision only as the nature of the business changes or better ways of expressing the objectives are found. *Goals* (or milestones) are derived from objectives and are specific, measurable and have a timed limit for completion. Goals should be formulated each year or for some other appropriate period depending upon the results to be accomplished. As examples:

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Objective—to carry on a versatile, growing and profitable business in manufacturing sheet metal products of proven quality and performance at competitive costs.

Goal (derived from objective above)—to achieve a shop cost output of $600,000 during the current year.

The stating of objectives and specific goals is an essential step toward the achievement of the common purpose of the business and should be established by the manager of a component for himself, with the agreement and understanding of his immediate supervisor. In order to develop capabilities and to attain optimum achievement, goals should be something to strive for, something above and beyond the established budget requirements. Personal satisfaction, respect and esteem are the rewards of accomplishment of goals which have been aimed high. Establishment of goals must reflect at least the following "standards."

1. Goals are to be established for important areas of attention for each function of the business.
2. Only items of major significance should be considered.

MANUFACTURING SECTION GOALS FOR 1957 (Sheet Metal Operations Sub-Section)

Goal	Performance			
	Excellent	Good	Fair	Poor
1. Produce and ship a shop cost output of $600,000 by 12-31	$600,000	$550,000	$500,000	$450,000
2. Reduce shop cost of inlet cover by 15% by year end.	15%	12%	8%	5%
3. Maintain a ratio of indirect personnel to direct labor manpower below 30%.	25%	27%	30%	35%
4. Reduce manufacturing losses to below 20% ratio to direct labor.	10%	15%	20%	25%
5. Carry on an aggressive cost reduction program to exceed $40,000 by 12-31	$ 60,000	$ 50,000	$ 40,000	$ 30,000
6. Maintain cost of quality at a level below 5.5% ratio to sales dollars.	4.5%	5.0%	5.5%	6.0%
7. Keep overtime requirements to a level below 3% of total man hours worked.	2%	3%	4%	5%
8. Increase inventory turnover rate to 8 or above by year end.	9	8	7	6

The figures shown in this exhibit are for illustrative purposes only and have no reference to actual conditions.

EXHIBIT 1

3. Goals of each sub-function must be compatible with the goals of the total department.
4. Several levels of performance should be indicated. These can be designated as excellent, good, fair and poor.
5. The values can be arbitrary, based on the best judgment and the aims of the manager who is preparing the goal.

To illustrate, Exhibit 1 may be considered as a typical set of goals for a manufacturing shop operations component. Similar types of goals can be developed to aid management in evaluating performance in many other significant areas, such as:

1. Unit cost of products
2. Indirect manufacturing expense
3. Inventories
4. Overtime
5. Plant investment expenditures
6. Types of wage payments
7. Cost of quality
8. Utilization of capacity
9. Absenteeism
10. Personnel development

Graphic Representation of Goals

By this time, the reader may well be wondering how performance in relation to the established goals can be presented to management in a manner which will convey the message without confusion or complication. Actually, simplification is achieved easily by the use of a series of graphic charts each of which can be designed to give visual portrayal of the progress for the entire period. A standard size form is utilized, so that the charts may be kept in a notebook. The forms are made adaptable to specific goals simply by using different scales and performance curves. Three steps must be taken in order to determine the graphic picture of each goal:

1. The range of performance must be considered in order to establish the scale to be shown vertically on the chart.
2. The levels of performance (goals) to be accomplished by the end of the year are to be indicated as excellent, good, fair, and poor at the year-end point on the chart.
3. Careful consideration of what represents excellent, good, fair and poor performance in the beginning month of the year should be reflected on the January line of the chart.

By connecting the beginning and ending points, the approximate curves of performance which should be anticipated during the year are established and the chart is ready for the plotting of actual results. It should be mentioned that

it is not necessary to establish scientifically the January and December points, since they are designed only to express the judgment and the aims of the manager whose goals are being measured.

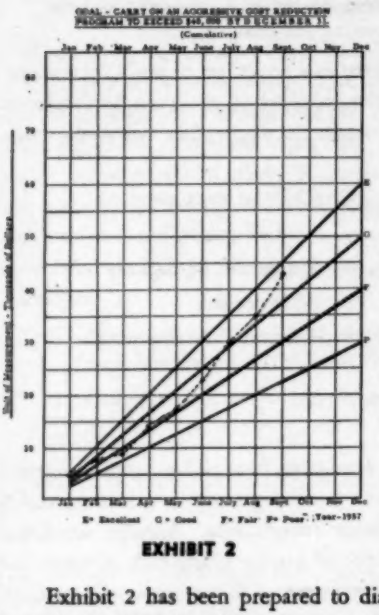
GOAL - CARRY ON AN AGGRESSIVE COST REDUCTION PROGRAM TO EXCEED $40,000 BY 12 DECEMBER 31.
(Cumulative)
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec
E
G
F
P
E= Excellent G = Good F= Fair P= Poor Year - 1957

EXHIBIT 2

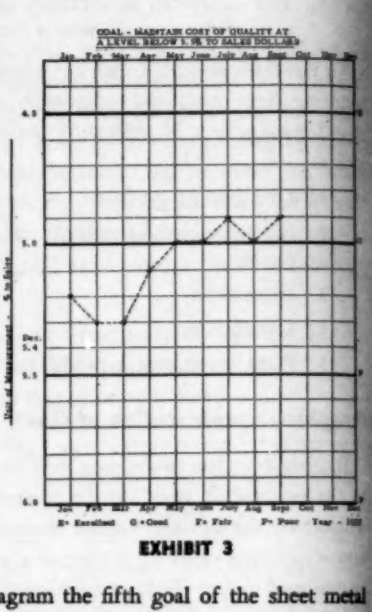
GOAL - MAINTAIN COST OF QUALITY AT A LEVEL BELOW 5.5% TO SALES DOLLARS
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec
4.5
5.0
Dec. 5.4
5.5
6.0
E= Excellent G = Good F= Fair P= Poor Year - 1957

EXHIBIT 3

Exhibit 2 has been prepared to diagram the fifth goal of the sheet metal operations sub-section, "to carry on an aggressive cost reduction program to exceed $40,000 by the end of the year". Since the program begins on January 1, all lines radiate from the zero point at the lower left corner of the chart. As each month's figure becomes available, the cumulative amount will be plotted. In Exhibit 3, the goal is to maintain certain levels of quality during the entire year. Therefore, there are no variations in the performance lines from month to month. In Exhibit 4, the important question was—what should be a reasonable performance to expect in January, knowing that the 1956 year-end result was 5.7 per cent? A turnover of 9 would appear to be beyond attainment in the early part of the year. Nevertheless, 7 could be considered to be excellent performance for January. However, a perfomance of 7, which would receive an "excellent" rating in January, would be not better than "fair" if not improved upon during the year. By building an improvement factor into the slope of the curve, the goals for each month can be made more realistic and incentive will be provided throughout the year.

Practical Measurements in Difficult Areas

Thus far, the goals which have been illustrated have been derived from statistics which are easily and routinely available. However, if a goal happens to be intangible or complicated, it does not necessarily mean that it is not possible to measure it at all. A measurement which has limitations is better than no measure, provided that it can be given a reasonable interpretation. The most worthwhile goals are those which are measurable. One type of goal which calls for an imaginative approach in order to be measured effectively is in the area of personnel development. Let us see how a measurement can be developed for a goal which reads like this:

> "Increase to 100% by year-end the depth of participation in the department's personnel development program."
>
> (Excellent—100%, Good—90%, Fair—80%, Poor—70%.)

In conjunction with the manager who established the goal, we first ask ourselves the basic question—what are the successive phases which make up the depth of participation? Analysis of the steps involved and the importance of each phase expressed in points results in a summary of the development program as follows:

Depth of Participation	
Phase	*Weight in Points*
Collection of personnel data	1
Opinion rankings	1
Administering of aptitude tests	1
Intensive interview	2
Evaluation of information	2
Preparation and distribution of analysis reports	2
Completion of discussion with individual by his mangager	3
Training recommended	3
Actual participation in a planned development program	3
Maximum possible points per participant	18

It follows that the performance toward accomplishment of the goal can be expressed statistically by a formula:

$$\text{Depth of participation} = \text{Number of people} \times \text{Number of points accomplished.}$$

If the entire one-hundred and fifty people who were eligible completed all phases of the program, the maximum points of accomplishment would be

$150 \times 18 = 2{,}700$. Therefore, the established levels of performance were:

Participation	*Points*	*Performance*	*Participation*	*Points*	*Performance*
100%	2,700	Excellent	80%	2,160	Fair
90%	2,420	Good	70%	1,890	Poor

A record of the progress of each individual is kept. Thus, when point totals are accomulated at each month-end, the plotting of the chart (Exhibit 5) is the final step in providing management with a visual interpretation of the personnel development program.

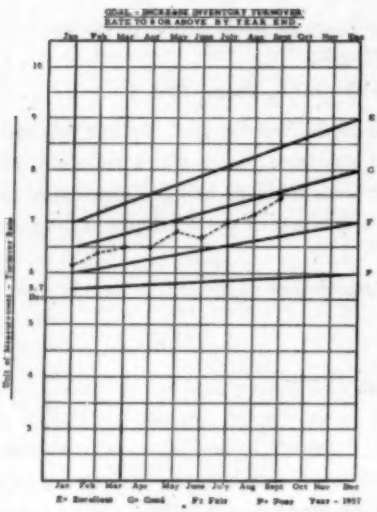
GOAL - INCREASE INVENTORY TURNOVER RATE TO 8 OR ABOVE BY YEAR END.
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec
E+ Excellent G+ Good F+ Fair P+ Poor Year - 1957

EXHIBIT 4

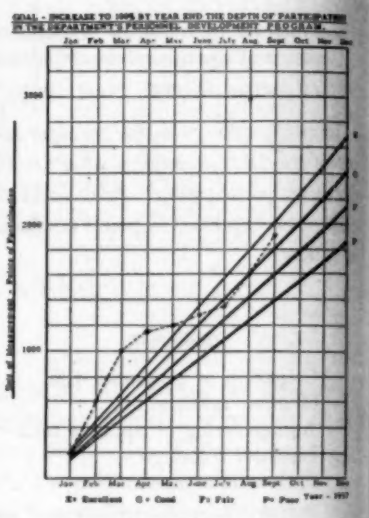
GOAL - INCREASE TO 100% BY YEAR END THE DEPTH OF PARTICIPATION IN THE DEPARTMENT'S PERSONNEL DEVELOPMENT PROGRAM.
Jan Feb Mar Apr May June July Aug Sept Oct Nov Dec
E+ Excellent G+ Good F+ Fair P+ Poor Year - 1957

EXHIBIT 5

Accountability for Progress

The next step in the measurements program is an appraisal of the performance and progress towards the goals which have been established. As soon as figures become available each month, a discussion meeting should be held between the individual and his immediate supervisor to evaluate the trends shown by the charts. The time-honored Chinese proverb which states that "a picture is worth ten thousand words", is exemplified by this type of a meeting. The supervisor's reaction might be, "I can see from the points on the chart where you have been and where you are now. Where do you expect to be next month

and the month after? Let's discuss some action plans which will stimulate progress in the areas which seem to require attention."

By carefully appraising strengths and weaknesses, discussing plans for improvements and by encouraging self-motivation and self-control, the individual can be guided to a better understanding and a better performance of his work. The accountability meeting affords an excellent opportunity to take stock and to look forward. In short, it is a time to look at the facts, get a new sense of proportion and to develop specific measures where appropriate and necessary.

Accomplishments To Be Expected

Management by objectives and goals is designed to replace management by jurisdiction. Objectives and goals are not meant to impose control but rather to develop self control. The need for exercising judgment and for making decisions is still a permanent basic requisite in the world of business. Objectives and goals and their measurements can result in more informed judgments and in soundly balanced decisions. These desired results follow from the list of accomplishments given below, to be expected from the approach which has been set forth in this article:

1. The major tasks to be accomplished during the year are highlighted by defining the goals and by measuring the progress toward their realization.
2. Periodic appraisal stimulates the need for having specific action plans for meeting the goals.
3. A continuous awareness of progress is possible. Attention can be focused on the future.
4. Trends toward realization of the budgets are emphasized. Goals do not displace the need for a formal budget program; they provide additional motivation on the part of the individual.
5. Goals are seldom exclusive to one function of the organization; therefore, coordination of effort is necessary for effective performance.
6. The preparation of goals and the periodic appraisal of progress toward meeting the goals results in a closer relationship between the manager and the individual.

CONTROLLING TIME CONSUMED BY MEETINGS by W. A. Kibler*

HOW MANY TIMES could you have said at the end of the day, "I didn't get a thing done today. Spent most of the day in meetings?" These meetings and the time they consume could be the first items to consider in this new phase of budgeting. There is no reason why meetings should be so time-consuming. They are a very necessary part of running a business or a department within a business but, if they are conducted properly, the time consumed should be at a minimum. In addition, we must strive to eliminate all unnecessary meetings.

First, let us consider the type of meeting the supervisor calls to inform his employees of a new procedure or change in the present procedure. These are very necessary, for it is a well-known fact that well-informed employees are good employees. One of the worst weaknesses in a business is the lack of communications. There are no reasons why this type of meeting should be time-consuming. The meeting should be short and to the point. The supervisor should be sure that the conversation is not allowed to wander off the subject. However, he should also be sure that the new or changed procedure is understood by all in attendance. We might point out that the same is true when a supervisor is asked a question by one or more employees on some difficulty encountered in the business or department.

Next, for proper control and smooth operation of a business or department, it may be deemed necessary to have periodic meetings of supervisors within a certain phase of the operation. Only problems should be discussed which are of mutual interest to all in attendance. Any individual problems should be discussed between the supervisor and the head of the department at a later date. All in attendance should come prepared to give a short outline of what has happened in their respective sections since the last meeting. This type of meeting should have a secretary appointed to take minutes and to write a report of the meeting for those in attendance. I have seen this type of meeting very effectively conducted in only one hour a week.

The most time-consuming meeting is usually that which is held to work out the answer to a problem or to formulate a new procedure. It is very important that one person assumes the responsibility of conducting a meeting of this type. He must first be sure that all necessary employees are in attendance. All discussion must be to the point. Minutes should be written and circulated to all in attendance. The key person in keeping the time consumed to a minimum is the leader of the discussion.

I would like to close with this formula for conducting a good meeting. It is not original with me, but I think it is very sound:

1. What is the problem?
2. What are all the possible solutions? List them and review them.
3. What is the best solution?
4. Make this solution known to all people concerned.

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Our Six-factor Bonus Plan for Foremen

by JAMES A. DeVILLE

THE FORT WAYNE DIVISION of the Weatherhead Company, which is comprised of four manufacturing plants and two major warehouses, is recognized as the world's largest original equipment manufacturer of automotive brass and steel tube fittings, drain and shut-off cocks, fuel and oil lines, brake hose, power steering hose assemblies, and dash controls. In addition, it furnishes aviation and industrial tube fittings, hose, hose ends, and hose assemblies to a sizable market. Some of the foremen in our plants are responsible for expenditures of up to $250,000 a year, which includes direct labor, indirect labor and expenses, excluding material costs. There are many businesses in our country today whose total volume does not exceed a quarter of a million dollars annually. It becomes apparent, therefore, that our foremen are spending a large amount of the company's money and our future efforts must be increased in guiding them towards more profitable operation of their departments.

For years we have pressured the foremen about reducing costs but, in most instances, we were in no position to show them where and how they could accomplish the reduction. Likewise, with fluctuating volumes so inherent in our automotive business, it was difficult at times to determine whether controllable costs were reduced in proportion to reduced volumes. With the introduction of budgets throughout our entire division, flexible manufacturing expense budgets were developed, making it possible to analyze manufacturing costs by departments for each item of expense. In our first efforts to furnish the foremen with such data, we tried to establish in their minds the thinking necessary to make them true business managers of their own departments.

Structure of the Plan

We felt that these budgets should not be one-sided and that bonus payments should be tied in directly with all the factors of cost that the foremen can control, thereby sharing with them a portion of the measured savings they can effect through their added efforts. With this objective in mind, the incentive

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described in the plan was developed. It is based upon six factors for productive departments and four for the non-productive departments. The following schedule shows these factors and the potential annual earnings to a foreman if he achieves the maximum effort on each factor:

	*Potential Bonus**			
	Productive Departments		*Non-Productive Departments*	
Factor	*%*	*$*	*%*	*$*
Variable burden cost	17.50	1,260	15.00	1,080
% of incentive coverage	1.25	90		
% of deficiencies	1.00	72		
Maintenance—good housekeeping	.75	54	.75	54
Safety	.75	54	.75	54
Plant wide performance	3.75	270	8.50	612
	25.00	1,800	25.00	1,800

% of potential	*Bonus per yr.*	*% of potential*	*Bonus per yr.*	*% of potential*	*Bonus per yr.*
100%	1,800	60%	1,080	30%	540
90%	1,620	50%	900	20%	360
80%	1,440	40%	720	10%	180
70%	1,260				

All factors excepting maintenance and good housekeeping are based upon actual accounting and personnel records; therefore, savings, if any, can be measured accurately. Since one of the purposes of the plan is to compensate the foremen for added effort expended in reducing controllable costs, it becomes necessary to establish a starting point against which improvement in these factors can be measured. This starting point is termed the "reference period."

By analyzing the bonus factors and costs prior to the installation of the incentive plan, a reference period cost or percentage factor can be determined. It is only after the foremen better this cost or percentage factor that they begin to earn a bonus. The budgets or goals are set so that, in total, they are approximately 20 per cent below the "reference period" costs or percentages. If the foreman achieves these for all factors, he is paid the maximum bonus of 25 per cent of his monthly salary. Therefore, if we pay the foreman 25% of his monthly salary in bonus, we can expect to save about 20 per cent of the controllable burden costs in his department, plus other savings in labor costs, as well as savings through increased productivity resulting from reduced fixed burden costs per unit.

* Based on $7,200 annual salary.

It is, therefore, the overall aim of this program to reduce variable burden costs by 20 per cent. However, we recognized that all foremen are not equally efficient and, in establishing the budget or goal as compared to the "reference period" costs, those foremen who, in the opinion of local plant management were least efficient, were given a budget or goal reflecting a greater than 20 per cent reduction in burden. Likewise, those foremen who were performing at the more efficient level were given budgets calling for less than a 20 per cent reduction. The overall plant wide reduction, however, was geared to an average of 20 per cent.

Significance of Performance Factors

Manufacturing expense, factor one in the tabulation given above, carries the greatest weight, since it is in this area of costs that we can expect to achieve the largest savings. A 10 per cent reduction in controllable burden costs at all of our four plants presently under this plan can result in hour very handsome savings. In order to establish reference period costs, the average cost per earned machine hour for each controllable item of expense in every department was determined by analyzing and evaluating past departmental performance. All nonrecurring exceptions which affected this past performance were eliminated to arrive at an adjusted reference period cost. The fixed and variable portions of each item of expense were determined by the use of scatter graphs which also gave us a picture of these expenses at various levels of production during the reference period. When established, the adjusted reference period cost was scrutinized by both plant accountants and plant managers to determine the maximum reduction in expense that could be effected, which resulted in an overall average of 20 percent. Some expense items in certain departments were cut as much as 50 per cent.

The foremen are furnished daily results on the second factor, per cent of incentive coverage, from which they can judge their progress. Incentive coverage is obviously an important factor to consider in budget control, since any improvement in this factor will help to reduce the labor time and cost of manufacturing, thus increasing capacities and market potential for our products. For example, if a worker on incentive coverage produces twelve earned machine hours while working eight actual hours, as compared to a worker not on incentive coverage producing six earned machine hours in eight actual hours, the foremen are getting twice the number of hours of budget allowance on variable manufacturing expense for the incentive covered worker and the company is getting twice the number of saleable hours in half the production time.

Per cent of deficiency is the third factor. Although we may pay insignificant amounts in make-up pay, if these payments are properly analyzed, we stand to gain much more in improved production in the future and can often turn a loss or marginal operation into a profitable one for the company. Deficiency payments are an instrument in the hands of the foreman which enables him to ferret out poor operators and improve them and also gives him an insight as to the capabilities of his workers. We feel a reduction of a few dollars on deficiency pay, properly achieved, is magnified many times in the future benefits to the company.

Maintenance and good housekeeping is a judgment factor in that the plant manager and superintendent make periodic checks of all departments and rate each one for housekeeping and equipment maintenance, with 100 per cent being perfect. The results of including this factor has been gratifying and, we feel, worthwhile, since, by encouraging proper care and maintenance of machinery as well as clean and uncluttered working areas, we encourage efficient operations. These go hand in hand with cost reduction and all the other bonus factors.

As to the safety factor, little need be said about the cost in production due to lost-time accidents. The following are some of the factors used in evaluating the safety incentive factor:

1. Loss-time accidents.
2. Response to safety suggestions.
3. Safety recommendations by foremen, insurance companies, and safety committees.
4. Observations by plant managers, plant superintendents, and personnel managers.

The purpose of the plant wide efficiency factor is to recognize each department's ability to affect the overall plant-wide savings of all departments covered under the plan. It will be noted from the table given previously that one-third of the service or non-productive departments' bonus is based upon the measured savings of all departments, whereas only 15 per cent of the productive departments' bonus is based on this factor. The service departments' bonus is weighted more heavily on plant-wide efficiency in order to recognize their greater ability to affect the operations of the productive departments and, also, since their costs are low, with a high per cent of their bonus fixed on their own performance, they might have a tendency to eliminate too much help to achieve better performance, thus affecting their ability to give sufficient service to the productive departments. The plant-wide efficiency bonus per cent is computed by multiplying the per cent of plant-wide savings realized on variable burden factor one,

times the bonus potential for the plant-wide efficiency factor. Assume reference period variable burden costs of covered departments to be $200,000 as opposed to budgeted costs of $175,000 for the month. Potential savings amount to $25,000, as shown in Example 1 below. Example 2 shows partial savings and Example 3 shows no savings:

	Example 1	*Example 2*	*Example 3*
Potential Savings	$25,000	$25,000	$25,000
Actual Savings	25,000	15,000	–0–
% Realized	100%	60%	–0–
Plant-wide performance factor			
Production depts.	3.75%	2.25%	–0–
Non-prod. depts.	8.50%	5.10%	–0–

BUDGET RATE SHEET

COVERAGE 83% | FORT WAYNE DIVISION | EFFECTIVE DATE 6/1/57

DEFICIENCIES 54% | PLANT #4 PLANT | % OF SALARY 100%

HOUSEKEEPING Fair | DEPT. NO. 12 | DEPT. NAME Machining

SAFETY Good | NORMAL CAPACITY HOURS 3,363

BUDGET					REFERENCE PERIOD	
FIXED COSTS PER MONTH	VARIABLE COSTS PER HOUR	BUDGETED COSTS AT NORMAL CAPACITY	NO.	ACCOUNT CLASSIFICATION	VARIABLE COSTS PER HOUR	BUDGETED COSTS AT NORMAL CAPACITY
				INDIRECT LABOR		
	.0173	58	03	REWORK	.0224	75
2,696	.1204	3,101	04	SETUP	.4192	4,106
			05	MATERIAL HANDLING		
Act.		Act.	16	PENSIONS		Act.
	.0345	116	17	NIGHT SHIFT PREMIUM	.0444	149
2,696	.3648	3,923		TOTAL LABOR	.7355	5,169
				INDIRECT MATERIAL AND EXPENSE		
	.1072	361	25	OIL, GREASE & CUTTING COMPOUND	.1388	467
			26	AUTO & TRUCK - GAS, OIL, GREASE		
			27	OFFICE SUPPLIES - PRINTING & STATIONERY		
			28	OTHER INDIRECT PROD. MATERIALS		
	.5776	1,943		TOTAL EXPENSES	.7475	2,513
2,696	.9424	5,826		GRAND TOTAL	1.4830	7,682

F-3113 3-31-58 Printed in U.S.A.

EXHIBIT 1

Determining and Reporting Results

The Budget Rate Sheet, Exhibit 1, is used to record budget and reference period expense allowances by department for each item of expense. Expense items on this sheet are broken down into fixed and variable expenses. Variable expenses are expressed in terms of cost per earned machine hour produced, for

both budget and reference period allowances. This sheet is the basis for determining monthly allowances based on actual earned machine hours produced, which are displayed along with actual operating results on the monthly Foremen's Departmental Operating Statement, Exhibit 2. In addition to these forms, a Foremen's Bonus Computation Sheet, Exhibit 3 is made up, reflecting in detail all factors involved in arriving at the bonus. This report is issued by the 10th working day following the month reported. Based on these reports, separate bonus checks are issued quarterly so that the foremen will receive fairly substantial amounts when the pay-off comes.

FOREMAN'S DEPARTMENTAL OPERATING STATEMENT
Fort Wayne Division

Plant: Plant #4 — Dept. Name: Machining
Foreman: John Doe — Dept. No.: 12

Earned Machine Hours Produced	Month. June '57	Year to Date
Actual	4,009	21,312
Normal	3,363	20,182

Monthly Budget						ACCOUNT	Year to Date		
Fixed Costs	Variable Costs	Total Budget	Actual Perform.	Refer. Period	No.	CLASSIFICATION	Budget Costs	Actual Costs	Refer. Period
						Indirect Labor			
	69	69	17	90	03	Rework	364	292	473
2,696	483	3,179	3,351	4,377	04	Setup	18,574	20,430	24,984
					05	Material Handling			
350		350	350	350	14	Bonuses	2,100	2,100	2,100
272		272	272	272	16	Pensions	1,632	1,632	1,632
	138	138	85	178	17	Night Shift Premium	727	317	961
3,843	1,462	5,305	5,498	6,792		TOTAL LABOR	30,624	34,860	38,478
						Indirect Material & Expenses			
	430	430	381	556	25	Oils, Greases & cutting Compo	2,284	2,676	2,936
					26	Auto & Truck-Gas, Oil, Grease			
			3		27	Office Supplies - Prtg & Stat.		3	
					28	Other Indirect Proc. Material			
	72	72	57	94	29	Sundry Supplies	466	561	581
					30	Cafeteria Food			
565	2,789	3,354	3,256	4,035		TOTAL EXPENSES	18,640	16,139	22,266
4,408	4,251	8,659	8,746	10,827		GRAND TOTAL	49,264	50,999	60,743

EXHIBIT 2

Avoiding Pitfalls in Plan Administration

Our plan is guaranteed to the foremen each year for a one-year period. We feel that this is necessary if they are to acquire any faith and confidence in it. In administering the plan, management was cautioned that budgets are tools in the hands of our foremen to guide them in doing a better job for the company as well as for themselves, and were not to be used as a club over the foremen's heads, that management should do everything possible to solicit suggestions and ideas from the foremen as to how they can improve their departments. As

FOREMEN'S BONUS COMPUTATION SHEET

Fort Wayne Division

DEPT. NO. 12 Plant #4 PLANT

DEPT. NAME Machining FOREMAN John Doe PERIOD COVERED June 1957

FACTORS	Variable Costs and Bonus Factors Budget	Actual	Reference	Savings Potential	% of Savings to Potential	Bonus Factors	Bonus % Earned
Burden Cost of Work Produced — Total $ Amount per Hour (No. of Hrs. 4,000)	8,659	8,746	10,827	2,081			
	2.16	2.18	2.70	2,168	96.0	17.50	16.80
% of Incentive Coverage	100.0	95.0	87%	12% 17%	70.6	1.25	.88
Deficiencies — Total $ Amount	0	6.00	18.00	.36			
% of $ 3,300 of Incentive Direct Labor	0	0.18%	0.54%	.54	66.7	1.00	.67
Maintenance and Good Housekeeping					75.0	.75	.56
Safety					100.0	.75	.75
Total Bonus % Earned (For Own Department's Performance)					92.5	21.25	19.66
Total Bonus % Earned (For Plant Wide Performance)					40.0	3.75	1.50
Grand Total Bonus % Earned					84.6	25.00	21.16

(A) Actual Coverage
Incentive Direct Labor Hours 1,298
Total Direct Labor Hours 1,365
% of Incentive Coverage 95%

100 % of Monthly Salary 400.00
Bonus Earned 126.96

EXHIBIT 3

an aid in guiding the foremen in meeting their budgets or goals, daily labor reports are issued indicating, among other things, deficiencies, downtime, and incentive coverage. The foremen must be advised of these matters currently, since a monthly report is of little value in correcting day to day inefficiencies.

Some non-productive departments are not participating in this incentive plan because their expenses are primarily non-variable, in the nature of salaries and other fixed expenses. The departments are personnel and first aid, production planning, tool cribs and supply stores, tool engineering and routing, and cafeteria. Likewise, the inspection department foremen (or any other foreman reporting directly to the plant manager) do not share in the bonus plan. However, regular-type budgets are established for all departments not participating in the incentive plan and the performances of these foremen are measured in this way.

The incentive budgets when set must be realistic but also somewhat on the tight side and this, because they are the basis for bonus payments, will force a better than average accounting for, and control of, costs. Since bonus amounts are determined monthly, precautions are taken to assure even distribution of expenses as a measure to prevent foremen from trying to defeat the bonus plan by skimping one month and expensing excessively the following month.

Revisions in the budget allowances are made as conditions change, if they are beyond the control of the foremen. Management may initiate improvements in machinery, methods, or layout which will require a change in the budget. Likewise, a general wage increase requires a corresponding increase in budget allowance.

Throughout all of our plants, there are foremen who supervise not one but as many as four different departments. Under this program, they are paid the bonus earned in each department based upon the pro-rata share of their salary charged to each department. For example: John Doe spends 60 per cent of his time in the machining department and 40 per cent in the plating department. Any bonus he earns in the former would be computed on 60 per cent of his salary, and similarly for the latter. The foreman is advised of the percentage split of his salary between the various departments he supervises. When two or more foremen supervise the same department on different shifts, they each receive the same per cent of bonus earned.

There are other special problems which arise in making certain that the incentive plan operates smoothly and accomplishes its intended objectives. The following list is suggestive of considerations which must be kept in mind:

1. Capacities determinations.
2. Proper mix of fixed and variable budget allowance to avoid excessive fixed allowance in low production periods.
3. Excess expense entailed in tooling up for model change.
4. Excessive short runs to customers.
5. Overtime which must be worked to meet initial delivery dates.
6. Tooling (should be on requisitioning basis.)

More Than Satisfactory Results

The foremen's bonus plan which has been detailed here has been in effect at three of the plants of the Fort Wayne Division for two years. Our experience with the plan has been very enlightening and "dividends" have been realized. Foremen's incentive budgets have cost no more to administer than would ordinary budgets requiring less rigid control of expenses but have, in fact, forced us to maintain above average accounting and control records. The result of our plan has been that foremen take more interest than ever before in controlling factory costs and management can measure their progress in dollars and cents.

Controlling the 13 Elements of Work in Process

by JULIUS WIENER

THE GENERAL OR FACTORY LEDGER ACCOUNTS controlling materials in process are the well-known typical work in process accounts. This conventional set-up is no longer satisfactory for its purpose. Modern industrial development, differentiating and increasing the number of raw materials and products, has created a varied traffic of material transports over factory yards and no control of material transfers among many departments is ever sufficiently detailed and accurate.

The concept of the work in process inventory, itself, invites a closer analysis and revision. Accepting the idea that everything is subject to some relativity, we may assume that the concept of the work in process inventory does not express an absolute idea. For the materials in process, it is the place where they *are* and where they *move* which determines their purpose and their functions in relation to departments. As they move through operations, their immediate purpose is changed with every change in place. Materials in the stockroom are raw materials for the whole factory. I would like to call these, "factory raw materials." Raw materials received in a department from the stockroom are its "departmental raw materials." Materials finished in one department are a product of that department; they are a "departmental product." When departmental products are transferred to a succeeding department, they are again departmental raw material.

Accounts for Departmental Raw Materials and Products

Before any process can be started, a department must receive some materials through requisitions from the stockroom or through interdepartmental transfers from a preceding department. Materials received in a department usually are charged to its work in process account and materials which, during and at the end of the period, have not been used in a department remain so charged beyond the end of the period. Our analysis is concentrated on and begins with this item. Though the departments are eager to avoid carryovers of unused raw materials from one month to the next and though the supervisors try to make

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their requisitions on the basis of the estimated need, they do not usually succeed. This situation is further aggravated by an uneven flow of interdepartmental transfers.

It is not always possible to keep such inter-period carryovers of departmental raw materials small in size or insignificant in quantity. In many factories, it is possible to find at the end of a period, in some departments or in all, unused departmental raw materials in quantities exceeding one-third of monthly usage. Such large quantities must be taken as a separate item. It would be incorrect to consider them, for costing purposes, as materials in process in that department. In process in a department is truly only that material which effectively has been put on a machine or in a boiler or is undergoing whatever the treatment is applied in the department. Charging materials which have remained on the floor to the work in process will confuse any rational attempt to compute a satisfactory estimate of the stage of completion.

We must therefore accept the idea that those materials create a separate inventory item of their own. But, if they are a separate inventory item, then sound accounting principles require us to introduce for it a new control account. And, further, as soon as this idea is accepted, it imposes automatically a further change in conventional accounting practice. When such a departmental raw material control account is set up, its mere existence requires us to charge to it material received in a department, rather than to charge material directly to production. Needless to say, all departmental raw materials, as they are used, put into production and charged to the work in process, are credited to the departmental raw material inventory on floor in all departments.

It is similar with departmental products. Wherever the process between two consecutive departments is not fully continuous, some of these usually remain in the department after they have come out of the process, and are "completed units on hand". We must accept the idea that those materials also create a separate inventory item of their own and require a separate control account on the books. Again, as soon as this control account is set up, its mere existence will require us to charge to it all finished departmental products and to credit it with all transferred completed units.

Both as to the new departmental materials and departmental products accounts, we must keep in mind a further detail. As the unit costs can and do change from month to month we must keep, for accounting purposes, materials received or departmental products finished during the previous period separated from those received or finished during the current period even though they have the same function and go the same way in and between consecutive processes.

Identification and Classification of Departmental Inventory Elements

For a complete classification of all inventory elements we have to:

1. Identify them through all movements during a period.
2. Classify them in and by all locations where they are at the beginning *and* end of a period.

Thus far we defined two pairs of inventory items which both can and will be present at the beginning and end of the periods. Both have to be inside of the all-factory process, moved ahead, transferred to a next point. The members of those pairs will move in the same direction but we have to follow carefully the movement of each member of both pairs:

1. *Departmental raw materials on the floor at the beginning and received during the month.* Both are put into production. At the end of the period, the first is usually used up and the remaining balance originates only in the second. If none of them is fully used up, the remaining balances of both are to be merged and the costs are averaged. This gives us five inventory elements.
2. *Departmental products on the floor at the beginning and those produced during the period.* Both are transferred to a next department. If the remaining balances originate in both, they are merged and the costs are averaged. This also gives us five inventory elements.

Adding to these ten elements the departmental work in process inventories at the beginning and end and the units lost in process, we have identified thirteen inventory elements. Statement of them helps us to recognize our complete departmental inventory picture and to see exactly what we have to control. These elements are listed below. In this list and in the remainder of the article, although the expressions "departmental raw materials" and "departmental products" have been used until now for maximum of precision of thought, the expressions, "raw material on floor" and "completed units on floor," are substituted because they are more in conformity with the conventional accounting vocabulary. The thirteen element list follows:

1. Raw materials on floor at the beginning.
2. Raw materials received during the month.
3. Work in process inventory at the beginning.
4. Input from raw materials on floor.
5. Input from raw materials received during the month.
6. Completed units on the floor at the beginning.
7. Units completed during the month.
8. Completed units on floor at the beginning transferred out.
9. Units completed during the month transferred out.
10. Completed units on floor at end.

11. Work in process inventory at end.
12. Raw materials on floor at end.
13. Units lost in process.

It is not always necessary to control all the 13 elements listed above. For example, Items 1, 2, 4, and 12 are not always present and they can be skipped when materials enter into the processes in each department as they arrive. In the same way, Items 6 and 8 are eliminated whenever it is possible to transfer out of a department all units as they are completed. But no approach to a control of inventories in process can omit, with scientific conscientiousness, presenting procedures encompassing the widest range of actually traceable possibilities.

The Inventory Control Form

Controls require definite records and records require a form for the entries. The first question to be decided is: how many forms? At first glance, it appears rather awkward to have items for so many elements on one form. The fewer the items the nicer the form and the easier the work. Three forms could be used and each one would be controlled by one question. But, unfortunately, the first tests made with three forms proved that such a set of forms would not work satisfactorily. Besides that, one form has a definite advantage in presenting the whole picture at once. One cannot overrate the importance of a correct purposeful design of such a form. The order of columns and headings, the choice of items to be put in columns and in lines pose some questions. They have to conform to some inherent rule dictated by logic.

In Exhibit 1, this form is presented. The order of columns leaves some doubts. It may be varied to conform to special interests in different factories and to the personal preference of the cost accountant. This form may be called simply Inventory Control and it can be indicated with the symbol, IC. The first column, reserved for listing the materials, is not numbered, in order to have as many numbered columns as there are inventory items to serve for reference purposes. We shall make much use of such references, as we need to establish mathematical rules which govern the interrelationship of the quantities in different inventory items. The symbol (3) will indicate to us "the quantity of the initial work in process." The symbol (1) + (2) will mean: "the quantity of raw materials on the floor plus the quantity of raw materials received during the month."

The lines are for items of materials. As is evident on the form, a reference letter is assigned to each line. The use of these letters is to facilitate the identification of many materials in many places and movements inside one department.

INVENTORY CONTROL

MATERIALS	Raw Materials On Floor At Begin	Received	Wip At Begin	Input From Col. 1	Input From Col. 2	Compl. Units On Floor At Begin	Compl. Units Compl. During This Month	Trans. Units From Col. 6	Trans. Units From Col. 7	Compl. Units On Floor at End	Wip At End	Raw Mat. On Floor at End	Lost Units
	1	2	3	4	5	6	7	8	9	10	11	12	13
a	750	12,400	3,800	750	10,100	-	11,860	-	9,200	2,660	3,050	2,300	440
Corrected a	750	12,400	4,500	750	10,100	-	11,860	-	9,200	2,660	3,050	2,300	440
b	10,200	45,600	6,300			-	50,580	-	50,580	-	4,800	4,200	2,200
Corrected b	10,200	45,600	6,300	10,200	41,400	-	50,580	-	50,580	-	5,120	4,200	2,200
c	2,300	11,200	3,500	2,300	8,350	2,000	11,180	2,000	10,080	1,100	2,450	2,850	520

EXHIBIT 1

One letter will indicate one material as long as it is not split into two or more products or as long as it is not combined with another one to form a new material. To new materials, emerging out of the process, of course, new letters have to be assigned. There are not sufficient letters available to serve this purpose in some multiple-product factories. As soon as more than twenty-four letters are used, it will be necessary to use two letters or bracketed numbers. We find on the form three pairs of columns:

(1) and (2) Raw materials on floor and received

(4) and (5) Input from the floor and from current receipts

(8) and (9) Transfers from the floor and from current production.

Each pair represents just one inventory item but each member of the pair is, nevertheless, a definite inventory element for inventory control purposes, as has been explained, originating in different times and places and chargeable to current production at different costs.

In all computations, costing or accounting, the figures from these three pairs of columns must be entered together because they have a common influence on the production and the formation of unit costs. There is a fourth pair of columns, (6) and (7), representing completed units on the floor at the beginning and those produced during the current month, but (6) has no influence upon the costs of the department while transfers of completed units are controlled by (8) and (9). The figures from (6) and

(7) can be separated and governed by rules applicable to each computation.

If the full quantity of materials available for the production in (1) and (2) has not been used up during a month, the balances from both (1) and (2) are transferred into (12) which automatically becomes (1) of the next month. This interperiodical transfer requires us to consolidate the balances. The quantities and values are totalled and their prices averaged. Materials recorded in (2) are received during the month from the stockroom or from a preceding department. If a material was received from the stockroom many times at different prices, these must be averaged. Materials received from a preceding department do not change unit costs during one month. If the full quantity of completed units available for transfers to next departments in (6) and (7) has not been transferred at the end of a month, these balances are transferred into (10) which automatically becomes (6) of the next month and this interperiodical transfer also requires a consolidation of the final monthly balances. The quantities and values are to be totalled and the unit costs averaged, so that each material will be charged to the next period at one cost.

The Equations

The inventory control form is controlled by the following four basic equations:

A	(1) + (2)	= (4) + (5) + (12)
B	(3) + (4) + (5)	= (7) + (11) + (13)
C	(6) + (7)	= (8) + (9) + (10)
D	(1) + (2) + (3) + (6)	= (8) + (9) + (10) + (11) + (12) + (13)

The chief purpose of these equations is to assist in finding inconsistencies always possible in statements of inventories. Inventory items are stated on the basis of physical counts, simple estimates or computations per balance. They all can be inconsistent with each other or directly wrong. Due to rules of logic, inventories are right if they satisfy the above equations and, if they do not, they are wrong and corrections must be made.

The main equation is Equation D and it is this equation which should be satisfied first. Whenever a required item is unknown, it should be found, if possible, through the solution of Equation D. The left member of that equation contains all items before the monthly production: raw materials on the floor at the beginning, raw materials received, materials in process at the beginning and completed units on the floor at the beginning. The right member contains all items after the production: completed units transferred, completed units

remaining in the department, materials in process at the end, raw materials on the floor at end and lost units. Items identifying movements of materials inside a department, the input and the production, are not contained in Equation D and, thus, this equation cannot be used to control mistaken records of the input or the production. It is, of course, always possible that mistakes have been made merely in recording material developments inside a department but, regardless of the location of any mistake in inventory figures, the principal rule of all accounting remains unchanged and should always be satisfied first: the cumulative quantity of all inventory items available before the production must be identified after it as transferred, present, or lost.

Hence, if both members of Equation D are not equal, a correction must be made immediately. But a new problem arises. Which member (side) has to be corrected and which item in it? By trying to solve Equations A, B, and C or one or two of them, it will usually be possible to identify the erroneous item. If this means does not help and no other known factor can help to make this statement, the rule of common sense applies: to correct the item most remote in terms of time or space, and to accept the latest ones as correct. For example, if it is obvious that the mistake is in (1) or (2) or in (12) and it cannot be stated which of them is wrong, common sense dictates that we correct (1) or (2). All such corrections can be handled as independent expense and can be controlled by one cumulative control account under the heading of "inventory variations". There is no objection to setting up departmental inventory variation accounts. Such an account, if all details are entered in it directly (or in subsidiary accounts), produces an excellent picture of all mistakes in inventory statements and gives a clear indication of where they originate. Repetitive mistakes and inaccuracies in one direction will require proper action by the management.

When Equation D is satisfied, we have to conclude that all items in it are correct and that only such items as are not contained in it may require further correction. It will be immediately observed that Items (4) and (5) are contained in Equations A, and B, while Item (7) is contained in Equation B and C. If the left and the right members in those three equations are not equal, it is certain that the mistakes made are only in these items. It must be kept in mind that, as long as the four equations are not satisfied, no costing or accounting work can ever be correct.

Mistakes and Neglect in Inventories

Besides inconsistencies and errors, it often happens that some inventory items are not stated at all. In many factories, the situation is not perfectly ideal.

The cost accountant needs for his work much information. He must know the quantities received, put into production, produced and transferred. This information has to be supplied to him by many people. Among a dozen or more supervisors, some will be friendly and cooperative but some will develop a hidden resistance against such cooperation and their information will lack a full degree of reliability. Most writers of cost accounting avoid discussing these bitter experiences of cost accountants, but those working in actual practice are well aware of the problems posed by them. The cost accountant who receives on time and correctly stated all the necessary information is a happy man but he usually runs across a situation where there is no record of some item necessary for his work.

Physical counts of inventories are not taken monthly. This means that the work in process inventories must be estimated or computed per balance. Both are a necessary evil. The estimates are never fully accurate and they always produce the need for reconciliations with previous estimates. Computations per balance can be based only upon other inventory items as stated by physical counts or by estimates, and they are also are not fully accurate. Thus, computations per balance also require reconciliations with previous computations. However, if the input and the output are stated correctly, the computation per balance of the work in process inventory is easily possible and, in this case, the picture of the flow of production as seen by the cost accountant is a simple

"One Floor" Production Picture

	WIP beg.	INPUT	OUTPUT	WIP end	LOST
B	(3)	(4) & (5)	(7)	(11)	(13)

The work in process at the end, regularly unknown, can be found by the cost accountant through the solution of Equation B:

$$B \quad (11) = (3) + (4) + (5) - (7) - (13)$$

and, if the supervisors are able (and have time) to estimate the work in process, their estimates can be matched with its amount as computed by the cost accountant.

In many factories the input must be measured with a high degree of accuracy, but this is not true in all factories. In many it is not an absolute necessity to measure the input, as the production can go on without any measurement of it. If the input and the work in process at the end are not known, then we have two unknowns and the "one floor" production picture supplies us insufficient elements for an efficient and accurate inventory control. In this case the pro-

duction picture must be completed by two additional "floors." As seen by the cost accountant, this is expressed by the development illustrated in Exhibit 2.

If we have to state both work in process at the end and input, we can pro-

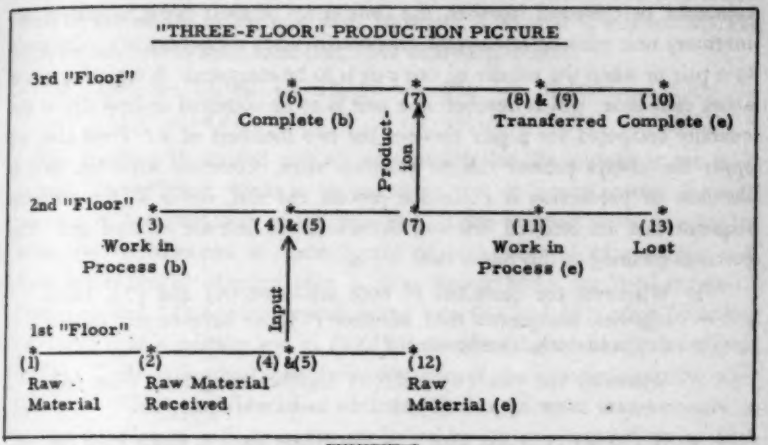

EXHIBIT 2

ceed in two different ways. The first way would be to apply Equation A and to first find the input by solving that equation:

$$A \quad (4) + (5) = (1) + (2) - (12)$$

When the input is thus computed we apply Equation B to find the work in process inventory at the end:

$$B \quad (11) = (3) + (4) - (7) - (13)$$

This solution, to find both input and work in process inventory, contains some dangerous possibilities. It is possible that (12) or (3) are inaccurate figures and the results thus obtained may be inaccurate. It is thus better to choose the second way for that computation, which also conforms to the previously stressed principle of first applying Equation D whenever this is possible. From Equation D we can obtain the work in process at end:

$$D \quad (11) = (1) + (2) + (3) + (6) - (8) - (9) - (10) - (11) - (12) - (13)$$

Having thus found the work in process at the end, we compute the input by applying Equation A or B or, better still, both and the result in both must be equal. If the result obtained by A and B for (4) and (5) is not identical, we have to conclude that, in the previous computation, a mistake was made and we will have to re-check it.

The Pairs of Columns and The Inventory Elements

Despite the rule that the members of any pair of columns are entered together, stay together, go together, are known or unknown together and are computed or corrected together, the consistency of their being united in one inventory unit must be interrupted temporarily when corrections are to be made to a pair or when the volume of one pair is to be computed. A typical question arises each time: which member of a pair is to be corrected or how divide the quantity computed for a pair between the two members of it? Here also, we apply the always present rule of common sense. Common sense tell us that the flow of production is a planned process and that, inside it, the materials required first are received first and those received first are finished first. The practical meaning of this rule is this:

1. Whenever the quantities of both sub-items (4) and (5), taken together, are greater than sub-item (1), we have to set: (4) = (1), and the balance to equal (5).
2. Whenever the pair (8) and (9) together are greater than (6), we have to set: (8) = (6), and the balance to equal (9).
3. If (4)+(5) is less than (1), the whole input is taken from raw materials on the floor and there is no (5) while the balance remaining in (1) is recorded at the end of the month in (12).
4. Whenever (8)+(9) is less than (6), all transferred units are taken from completed units on the floor at the beginning and there will be no (9), while the balance remaining in (6) will be recorded in (10) at the end of the period.

Different Solutions Represented by Materials A, B, and C

We return now to Exhibit 1. In this illustration, three materials are listed. In each line, all data for a single material are visible at the first glance. We will control Material a in the first line. A full control requires us only to apply four basic equations. We start with Equation D:

(1)	750		(9)	9,200 units
(2)	12,400		(10)	2,660
(3)	3,800		(11)	3,050
			(12)	2,300
			(13)	440
	16,950	$\neq$		17,650

A mistake is obvious immediately: The right side is 700 units greater than

the left. But where is the mistake? Which figure is wrong? No doubt, it is of utmost importance to identify a mistake as soon as it is discovered, but this is not always possible. Nevertheless, even if mistakes cannot be identified, we are not allowed to violate the rule: where there is a mistake, a correction must be made. Let us see now what Equations A, B, and C will tell us. Perhaps we may find in them some hint. First we try Equation A:

$$\begin{array}{lccccccccc} A & 750 & + & 12{,}400 & = & 13{,}150 & = & 750 & + & 10{,}000 & + & 2{,}300 \\ & (1) & & (2) & & & & (4) & & (5) & & (12) \end{array}$$

This equation is satisfied and we may assume that the mistake is not in its figures. Nevertheless, there is no guarantee that it is not present in equal amounts in both members of the equation. If the question arises whether the same error is contained in some figures on both sides of an equation, such equal errors can be expected only in those figures which are "tied together." From (1) and (2) figures are transferred into (4) and (5), often by setting (4) = (5). If a mistake was in (1), this mistake is automatically transferred in (4). Truly it is transferred from one side of the equation into the other side of it. This possibility raises a doubt whether an error is not present in another equation in such figures as are linked by some tie between them. Such offsetting errors remain uncovered as long as another equation does not direct our attention to them. We now try equation B:

$$\begin{array}{lccccccccccc} B & 3{,}800 & + & 750 & + & 10{,}100 & - & \underline{14{,}650} & \neq & \underline{11{,}860} & + & 3{,}050 & + & 440 & - & \underline{15{,}350} \\ & (3) & & (4) & & (5) & & & & (7) & & (11) & & (13) & & \end{array}$$

We find the same mistake in D and B. The right side in both is 700 units greater than the left. Responsibility for the error can be only in such items as appear on both equations and we have only three of them: work in process at the beginning, (3), and at the end, (11), and lost units, (13). The lost units all together are only 400 and they cannot be responsible for an error of 700 units. The remaining suspect items are the work in process inventories at the beginning and the end. But our search for the source of the mistake is not yet completed Before we are entitled to a definite decision, we must see what all equations say, and so we have to apply Equation C:

$$\begin{array}{lccccc} C & 11{,}860 & = & 9{,}200 & + & 2{,}660 \\ & (7) & & (9) & & (10) \end{array}$$

We find it satisfied. Now, what does this mean? Does it mean that all figures in C are right? Let us analyze the case of that equation. Undiscovered mistakes could be present only if equal errors would be contained on both sides of the equation. But on the left side of that equation we have only the pro-

duction, counted automatically on the producing machines, and we have (normally) no doubt that this figure is right. As this is one figure, the other member of that equation must also be right. We conclude thus with certainty that (7), (9) and (10) are right.

To continue the case of Material a, we now are certain that Equation A and C are right and equal discrepancies are found in Equations D and B. The mistake can be only in items common to D and B and they are the following: on the left side work in process (3), on the right side work in process (11) and lost units (13). As we have eliminated (13) as the source of this mistake, the error is possible only in the work in process inventory at the beginning or at the end. Whenever we are confronted with the necessity of reconciling two consecutive work in process inventories, we usually have no means of determining which of them has to be corrected. If the supervisor has made an estimate of both, we will accept as correct that one which is closer to his estimate. But, if no estimate was made and none can be made when the mistake is discovered, the single remaining solution is the application of the rule of common sense—to accept as correct the latest figure and to correct the remote one. The correction is made in (3) and the figure 3,800 is changed into 4,500. After that correction, all equations are satisfied. The adjusted Line a, is entered on the control form. The costing work can start.

Looking at Line b, we immediately observe that no figures are entered in Columns (4) and (5). No information is available as regards the input. We also are aware that we have no figures but just a dash in Columns (6), (8) and (10). This tells us that no completed units have been present in the department at beginning and none have been left in it at the end of the period. Consequently, all units completed have been transferred out of the department and, naturally, we find identical figures in (7) and (9).

It seems, thus, that we have only one job to do—to state the input, (4) and (5), which can be achieved through a solution of Equations A or B. Nevertheless, remembering that we always have to see first what Equation D will tell us, we decide to apply this equation first, though we know that (4) and (5) are not contained in it:

	(1)	10,200 units		(9)	50,580 units
D	(2)	45,600		(11)	4,800
	(3)	6,300		(12)	4,200
				(13)	2,200
		62,100	$\neq$		61,780

To our surprise, Equation D is out of balance by 320 units. Now we know

that something more is wrong than we realized at first. It is not only that we have to state the input; we also must identify an additional error in some other item. Yet, where is this error? Certainly, it cannot be assumed to be in (7) or (9) because we had no balance in completed units and all made have been transferred and are controlled on both ends. Also, we do not assume that the error is in the waste, because this material is collected on the floor and is measured with accuracy. Thus, we know that the error can be only in raw materials on the floor or in the work in process inventories at the beginning or end.

We must now apply both Equations A and B and compute (4) and (5):

$$\text{A}\quad (4) + (5) = \underset{(1)}{10{,}200} + \underset{(2)}{45{,}600} - \underset{(12)}{4{,}200} = 51{,}600$$

$$\text{B}\quad (4) + (5) = \underset{(7)}{50{,}580} + \underset{(11)}{4{,}800} + \underset{(13)}{2{,}200} - \underset{(3)}{6{,}300} = 51{,}280$$

What was found may be confusing to a beginner, but an experienced user of our equations certainly would have expected just that result: Two equations give different results for the same item because one of the figures appearing in one of the above equations is wrong. The difference between the solutions of A and B is no surprise; it is exactly the same figure found in D, i.e., 320 units. We now know how to identify the misstated item, because the above results indicate to us that only one item can be misstated by 320 units which is present in Equation D and in one of the Equations A or B. To locate the wrong figure we have to state all items present in the right members of all three equations:

D:					(9)	.(11)	(12)	(13)		
A:	(1)	(2)					(12)			
B:			(7)			(11)		(13)	(3)	.

and, tabulating them, we see that only Items (11), (12) and (13) are common to Equation D and one of Equations A or B. As we have decided to eliminate Item (13) we have only to make our choice between (11) and (12).

Now, we know well that it is easy to count with accuracy a raw material on the floor, but it is hard to estimate with accuracy a work in process inventory and, thus, we conclude that, in all probability, the work in process at the end was understated by 320 units. Increasing in B Item (11) by 320, the input in B is increased to 51,600 units, as it appears in A, and the same correction entered in D equalizes both members of that equation. Having stated (4) and (5), we set (4) = (1) and Item b is adjusted. The corrected Line b is entered on the inventory control form.

Line c is complete and there are no mistakes in it. The reader may compute the control by setting the four quations. But let us put a question. If in Column (10) the figure had been 800 instead of 1,100, Equations D and C would have shown on the right side less than on the left side and the necessary correction would have been stated immediately. The question is: what would the cost accountant do if Equation C does not balance? His thinking would have been like this: Item (6) and (10) are the balance of completed units in the department at the beginning and end of the period. We can watch those items the next time with all accuracy. Items (8) and (9) are transferred quantities and they also can be stated with accuracy the next month. If again this equation does not balance, then the registers on the machines automatically counting the volume of the production are wrong. If the registers are found to be in order, is there any possibility of increasing those counts artificially? Could there be collusion between a worker and a supervising clerk? Equations are equations. They do not defraud and they tolerate no cheating. What happened? Mistakes in recording the last inventories or the transfers? Is it possible that we are confronted with organized fraud?

For the time being, the cost accountant will correct Item (6) or (10) if he is not able to state the true source of the error, but his equations are a powerful tool if properly used and they will soon help him to find the truth.

The Final Aim

After the final adjustment of all inventory items for all materials, it is recommended that the inventory control form be re-written with correct figures. It will, then, be an invaluable source of information for all costing and accounting purposes.

The time necessary for the control and adjustment of inventory items cannot be judged by the time it has taken to read the preceding illustrations. The adjustment of the inventory picture by means of the method presented in this paper can be computed with a surprisingly high degree of speed. After a certain time, it seems that the four equations simply have grown into the brains of the employees in the cost accounting office and their way of thinking completely follows the pattern of the equations. It seems, also, that the column numbers become firmly imprinted in the mind of the employees and nobody will ever mention an "input" or a "work in process." In the conversations in the cost accounting office, only the column numbers are used to indicate the inventory items. Thus, we say, for example, "Bill, in your 4" copper discs you certainly have a mistake in (11)." Also, the items common in two equations are, of course, known by heart and no writing is necessary to select them.

For the adjustment of the inventory picture, only two tools are needed: an adding machine and a ruler. The reviewer of the inventory control form uses the ruler to keep his eyes following a line and the additions are shown on the adding machine tape. Corrections or inventory variations are stated immediately. The adjustment of a form with 20 materials recorded on it is completed in less than an hour.

Yet the final aim of a complete and precise control is not the speed of adjustment and not even the correction of inconsistencies and errors. The main purpose is a side effect which the proof of what is wrong will produce. Through the presentation of appropriate reports to all concerned, the importance of correct recording of all changes in the status of inventories in process will be brought to the attention of the management and the supervisory crew. The awakened ambition to avoid blame for neglect, mistake and error will produce a beneficent effect at all points.

ACCOUNTING FOR COST STAFF TIME

by John H. Lafferty*

IT IS A WISE MANAGEMENT that "beefs up" its cost accounting organization as the competitive business situation tightens. The watch word then becomes cost control, and we are all familiar with the results that renewed special cost control emphasis can achieve. However, when we reinforce our cost accounting staffs, who cost accounts for the cost accountants? This question quite naturally arose when our cost department was recently expanded to assume more extensive functional responsibilities.

The problem was reviewed with all cost personnel and the result is the weekly Cost Accounting Personnel Time Utilization Report, (Exhibit 1). It was covered by the following instructional memorandum:

"The background of this report has previously been discussed with you. As you know, its purpose is to enable us to ascertain what proportion of our time is spent performing the various assigned functions for which we are responsible. It is felt this information will be of value for planning purposes and in advising management of the values affixed to the various functions. Each person is to daily allocate his time according to the classification of functions shown. Time should be accounted for to the nearest .25 hour. Decimal equivalents (.25, .50, or .75) are to be used rather than fractions.

"At the end of the week, this report is to be totalled and given to

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COST ACCOUNTING PERSONNEL TIME UTILIZATION REPORT

Name _____ Plant _____ Week Ending _____

Function*	Code	M.	T.	W.	T.	F.	S.	Total

Detail of Functions*

Systems and procedures	Preparing journal vouchers and accounting notes	Conferences with other departments
Processing engineering changes	Preparing management reports	Instruction time
Calculating costs	Cost control projects	Typing and stenographic
Auditing vouchers	Pricing	Filing
Miscellaneous auditing	Inventory valuation	Miscellaneous (Explain)
Auditing time tickets and reports	Obsolete inventory accounting	Absence (Explain)
Costing scrap	Inventory planning and administration	Vacation or holiday
Costing export orders	Verifying costs and cost data	Personal time
Costing consignment orders	Supervision	
Miscellaneous costing		

Remarks: Supervisor

EXHIBIT 1

your supervisor, who will initial and send it to me. The reports should be in my hands each Monday morning. They will be filed for later summarization.

"Should you have any questions with regard to the classification of any specific function on this report, please clear them with your supervisor.

"It is believed the results of this study over a period of a year will be of special interest to all of us. Your cooperation in assuring that the reports are promptly submitted will be greatly appreciated."

All concerned are enthusiastic over the possibility of our being able to know how much time is involved in performing the various functions and the values which can also be attached to each. This information will most assuredly assist in planning and administering our "cost mission". There is also one by-product advantage of this new technique. It places cost accountants in a definite position to "practice what we preach". It is our hope that this same approach can be extended to other staff activities where similar data can be measured for useful application.

This approach is certainly not unique, but I thought it might be interesting to others very likely faced with the same concern.

Page-By-Page With a Small Company's Monthly Analytical Report

by ROBERT E. NEWBERG

TOO OFTEN, THE ACCOUNTANTS IN A SMALL COMPANY assume that a monthly report analyzing the financial results of operations as compared with forecast and prior periods is not necessary and that it is needed only in big firms. Therefore, they devote their full efforts to accumulating financial data and the extent of their reports to management may be a profit and loss statement and balance sheet with supporting schedules. It is left up to management to make comparisons with forecast and prior periods and to analyze the deviations which may occur. In the opinion of the writer, the accountant who limits his reports to these standard statements is passing up a real opportunity to be of service to his management and thus improve his worth to his company. This paper presents the efforts made by the financial division of a small (400 employees) manufacturer of precision metal products to supply top management with monthly analytical reports that would be a real aid in appraising past performance and guiding future decisions.

Determining Report Requirements and Management Needs

The first step in improving our reports was to take a critical look at present accounting reports going to top management. A review of the existing operating statement showed a two-page (down to the penny) report for the month and a similar report at the end of each quarter giving the year-to-date figures. These operating reports, along with a detailed two-page balance sheet, constituted the monthly report to management. The analysis of our reporting led to these conclusions:

1. As a historical record, these reports were excellent and served a purpose.
2. As an analytical report they fell short because:

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a. No comparison was provided and, thus, without a "yardstick," there is nothing with which to measure the success or failure of operations.

b. Vital figures were buried among the insignificant, due to the account-by-account down-to-the penny detail.

Our decision was to continue the detailed reports for reference and for historical records and to establish a monthly analytical report. The analytical report was to be designed to high-light the significant figures for the month and the year-to-date, make comparisons between actual, forecast and prior periods and explain deviations from plan and previous experience.

We had learned that the three prime requisites for a worthwhile report are timeliness, readability, and importance of the information. The first requirement meant to us that the monthly report must be issued before the information becomes ancient history. Fortunately, our closing was usually completed each month by the fifth working day, which allowed us to complete and issue our analytical report by the seventh working day.

Readability of a report is deemed by the writer to be of paramount importance. To the nonaccountant (and maybe even to accountants) vital facts regarding operations may be overlooked if the figures are presented merely in long columnar form. Figures stand out if high-lighted with editorial comments and supported with graphs and charts. The rounding of figures to a significant point also aids

1.

ANALYSIS OF OPERATIONS AND FINANCIAL POSITION

From: Financial Division — Subject: November 1957 Operations

To: Board of Directors — Date: December 9, 1957

YEAR-TO-DATE ----Significant Figures

	1957 Forecast	1957 Actual	1956 Actual
Sales	$3,965,000	$4,111,913	$3,276,410
Gross Profit	776,900	813,112	682,716
Ratio to Sales	19.6%	19.8%	20.8%
Net Earnings Before Taxes	401,500	431,493	373,716
Ratio to Sales	10.1%	10.5%	11.4%
Net Earnings After Taxes	197,800	212,159	184,441
Ratio to Sales	5.0%	5.2%	5.6%

NOVEMBER OPERATIONS ----Key Information (Same detail supplied as above)

EXHIBIT 1

in readability. Pennies are irrelevant and should be dropped. In larger companies, the hundreds are also deleted from reports. In our case, we decided to round figures to the nearest dollar. The length of the report also is a factor in

1.

ANALYSIS OF OPERATIONS AND FINANCIAL POSITION

From: Financial Division — Subject: November 1957 Operations

To: Board of Directors — Date: December 9, 1957

YEAR-TO-DATE ----At a glance

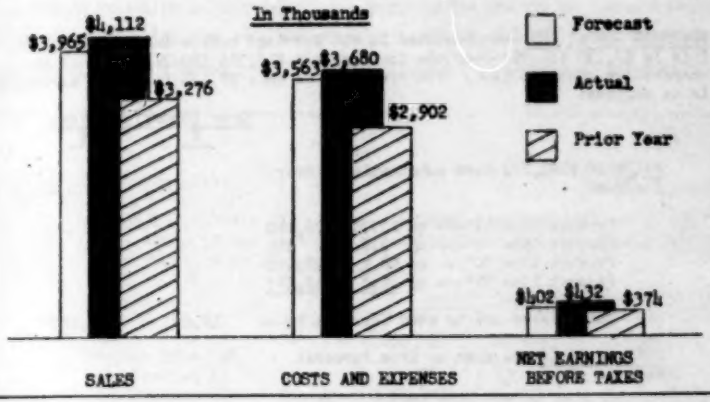

EXHIBIT 2

FINANCIAL POSITION ----compared with forecast and a year ago

	November 30		
	1957 Forecast	1957 Actual	1956 Actual
Total Assets	$1,395,000	$1,446,592	$1,116,712
Fixed Assets (Cost)	625,000	642,073	491,437
Fixed Assets (Net of Depr.)	400,000	417,244	321,372
Working Capital	478,000	475,445	278,201
Stockholders Equity	598,000	612,359	450,200
Book Value per Share of Stock	79.73	81.65	60.03

EXHIBIT 3

whether it has readability or not. The report must be long enough to cover the significant points of operations but not so long that it fails to hold the interest of the reader. We attempt to limit our analytical report to three or four pages of editorial comment, plus the condensed statements and a graph on sales.

The third prime requisite, that of importance, requires determining which facts and figures are significant and including those, while leaving out the irrelevant. In determining not only the items of importance but also their basic order of appearance, we went to those who were to receive the report (president, vice-president, general manager and vice-president sales) and asked each what

(2)

NOVEMBER OPERATIONS ---- resulted in net earnings before taxes of $46,106. This is $9,136 (24.7%) over the forecast and $17,326 (60.2%) ahead of the comparative month of 1956. The breakdown of this $9,136 favorable variation is as follows:

			Over (Under) Forecast	
			$	$
SALES of $421,877 were substantially over forecast:				
Product Line "A"--- up	20.7%	$28,140		
Product Line "B"--- up	0.7	820		
Product Line "C"--- up	98.4	28,510		
Product Line "D"--- up	15.0	11,557		
Total Sales are up over forecast by --			19.6%	$69,027
COST OF SALES are also up from forecast because of:				
Increased volume --- up		$54,504		
Change in product mix -- down		(283)		
Decreased costs -- down		(2,364)		
Total Cost of Sales exceed forecast by --			18.6	51,857
EXPENSES were in excess of anticipated. The major items of increase were:				
Advertising -- up	88.3%	$ 3,972		
Sales Travel -- up	47.6	1,353		
Commissions -- up	20.6	1,583		
All other -- up	6.7	1,417		
Total Expenses over by --			23.0	8,325
NON-OPERATING (net) varied only slightly, in dollars, from forecast --			(64.7)	(291)
NET EARNINGS BEFORE TAXES OVER FORECAST BY			24.7%	$ 9,136

EXHIBIT 4

he would like in the report. The remainder of this article shows how we sought to fill the needs expressed. In the exhibits, embodying the report described, the figures used are illustrative only.

Contents of Analytical Pages

Their suggestions were, in sum, that they would like just a quick recapitaluation of operations, containing for the month and year-to-date a comparison with forecast and with the same period of last year showing sales and selected profit figures with ratio to sales. This, then, gave us about three fourths of our opening page. The usual way we present it is as in Exhibit 1. One method we use to attract attention to a particular item is to rubber stamp an arrow towards the one figure we deem of vital importance, as illustrated. To keep our reports from becoming too stereotyped, every several months (usually at the end of a

(3)

YEAR-TO-DATE --- details:

SALES of $4,111,913 are $146,913 (3.7%) over the forecast and 25.5% ($835,503) ahead of the same eleven months of 1956. The breakdown by major product is as follows:

	January thru November		
	1957 Forecast	1957 Actual	1956 Actual
Product Line "A"			
Product #1	$ 513,000	$ 539,542	$ 589,669
Product #2	172,000	168,713	148,527
Product #3	220,000	189,029	83,217
Product Line "B"			
Product #10	1,065,000	1,137,012	1,296,421
Product #11	555,000	636,902	16,199
Product Line "C"			
Product #20	356,000	349,817	298,192
Product #21	237,000	164,503	163,306
Product Line "D"			
Product #31	225,000	246,312	181,327
Product #32	197,000	216,498	157,319
Product #33	89,000	99,220	71,398
Product #34	336,000	364,365	270,835
TOTAL SALES	$3,965,000	$4,111,913	$3,276,410

Attached is the analysis of sales in graphic form. Please note the effect of November operations on the twelve month moving average.

EXHIBIT 5

quarter) we present three key figures for the year-to-date in graphic form. The opening half page then appears somewhat like Exhibit 2.

Management personnel also indicated that they would like several balance sheet figures on the first page of the report. They wanted to know the total assets, how this total compared with a year ago and with forecast, how much we had invested in fixed assets before and after depreciation, what our working capital is and the total of stockholders' equity, along with the book value per

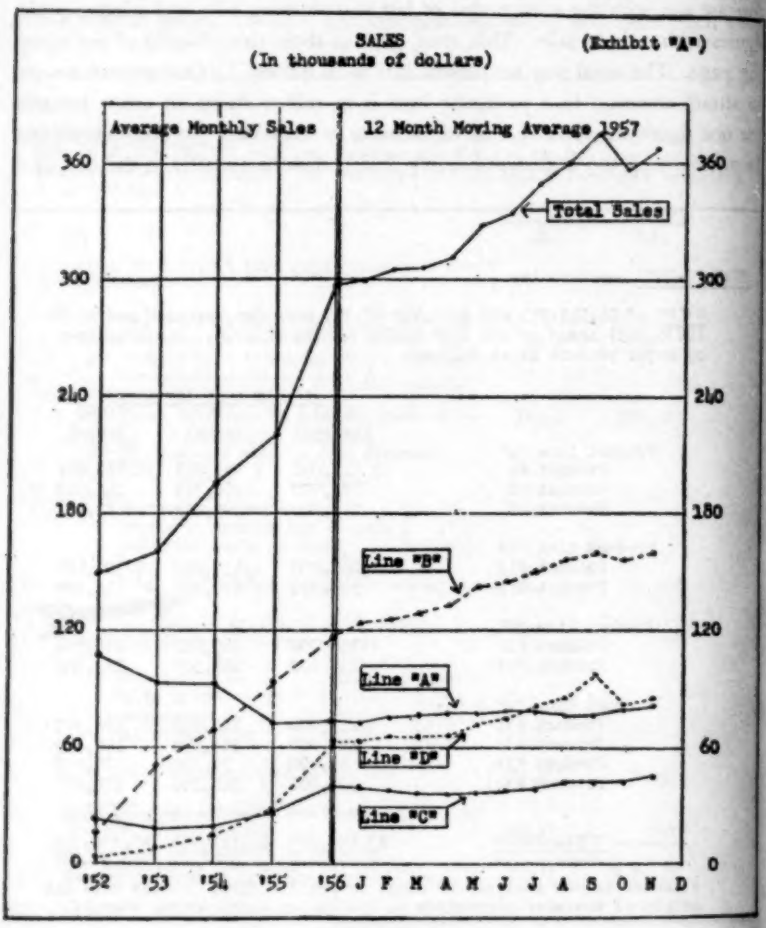

EXHIBIT 6

GROSS PROFIT RATIOS for the year-to-date average 19.8%. This is slightly above the forecast of 19.6% but approximately 1% below the comparative period of 1956. The decline from the ratio of 20.8% appears to be small but the dollar amount, when applied to 1957 sales, amounts to $42,000.

It should be pointed out that the price increases in product lines "A" and "D" are bolstering our margin --- please note the November Gross Profit Ratios of the product lines on the November operating statement.

Their are four major factors in the decline in our Gross Profit Ratio this year as compared with 1956:

1) Our Direct Labor average hourly rate for the first eleven months of 1957 is $2.28 as compared with $1.99 for the same period of last year.

2) The overall burden rate has risen this year by 9.2%.

3) Price increases effective October 1, 1957 in product lines "A" and "D" have helped to offset the increased basic rates.

4) Improved production methods have also aided in combating the profit squeeze.

EXHIBIT 7

share of stock. These figures comprise the balance of the cover page, as shown in Exhibit 3.

This completes the highlighting of the key figures and we next move into the presentation of some of the important details. This phase of the analysis may take several different forms. Occasionally, we present each segment under its own heading and compare actual with forecast and prior year (if pertinent). The parts we normally cover are: sales (by product line and, if significant, by major product within the line), cost of sales or gross profit ratios (along the same manner as sales) and expenses (by major items). The most frequent

DEPARTMENTAL EXPENSES total $386,024 --- $7,024 (1.8%) over the forecast and $73,428 (23.5%) greater than the same period of 1956. The major deviations from forecast are:

Sales Travel ------	over 15.2%	$3,615
Commissions ------	over 3.8	3,236
Office Payroll ----	under (2.6)	(1,588)
All other ---------	over 0.8	1,761
TOTAL EXPENSES ----	over 1.8%	$7,024

EXHIBIT 8

OUR CASH POSITION in March became the "tightest" it has been in number of years - - - following are the underlying factors in this cash squeeze):

Cash on hand and in the bank 1-1-57		$107,924
Funds became available by:		
Net earnings after taxes for the quarter	$ 51,670	
Plus non cash items deducted from earnings:		
Depreciation	16,012	
Income tax for the quarter	52,942	
Total available thru operations	$120,624	
Plus small increases in operating liability	11,037	131,661
Total funds available		239,585
Funds expended as follows:		
Increased investment in receivables	63,512	
Additional machines and equipment purchased	37,420	
Payments made on the new addition	43,519	
All other asset investments increased	3,992	
Total additional investment	148,343	
Payment made on 1956 Income Tax	89,327	
Total funds used		237,670
Net of Cash before 90 day note		1,915
Funds borrowed on a 90 day note 3-21-57 to give us funds sufficient to pay invoices and other cash expenditures		50,000
Cash on hand and in the bank 3-31-57		$ 51,915

EXHIBIT 9

manner of presentation that we follow is to break down the total deviation from forecast (we consider the forecast a more important guide than prior year, even though we use prior year figures for a reference) into the various parts. We then give the dollar amount and per cent of variance, along with a brief reason for the deviation, for each of these parts. This form is presented in Exhibit 4. It completes page 2 of the report.

Our next step is to analyze the details of the year-to-date operations. Again we vary the manner from month to month. Sometimes the method of analysis is similar to Exhibit 4. Other months the analysis is by segments, as has been mentioned. The basic pattern followed is reflected in Exhibit 5 which is an analysis of sales. At the bottom, there is a reference to a sales graph. This graph shows the average monthly sales by product line during the previous five years and carries a twelve-month moving average for the current year. An illustration of the graph is as shown in Exhibit 6.

The remainder of the third page of the report and a portion of the last might

CONDENSED BALANCE SHEET

ASSETS :	Forecast	Actual	Nov. 30th 1956	% Incr. (% Decr.)
Current Assets:				
Cash on Hand and in Bank	$ 90,000	$117,312	$ 84,312	39.1%
Accounts Receivable	375,000	426,817	313,740	36.0
Inventories	485,000	440,549	356,661	23.5
Total Current Assets	$950,000	$984,678	$754,713	30.5%

EXHIBIT 10

be devoted to an analysis of gross profit ratios as compared with forecast and actual. It might take the form of Exhibit 7.

The third phase of the analysis of year-to-date operations is the category of departmental expenses. The highlights are usually brief, unless a major dollar deviation occurs. They appear in the pattern described by Exhibit 8.

This normally completes our analysis of operations. We do include, when pertinent, comments on critical changes in balance sheet items. In reviewing our analytical reports during the past year, we noted one point at which our cash position had become very tight. We knew top management would want to know the factors behind the decline in cash. Our effort to place the reasons before them are embodied in Exhibit 9.

With the monthly analysis which has occupied our attention in this article, we include the condensed balance sheet and condensed operating statement portions of which appear in Exhibits 10 and 11, respectively. As already stated, figures shown in all exhibits are hypothetical.

OPERATING STATEMENT

	MONTH			YEAR TO DATE		
	Forecast	Actual	1956	Forecast	Actual	1956
SALES:						
Product Line "A"	$135,750	$163,990	$115,630	$ 905,000	$ 897,284	$ 821,413
Product Line "B"	110,250	111,070	92,000	1,620,000	1,773,934	1,312,620
Product Line "C"	29,800	58,310	23,840	593,000	514,320	461,498
Product Line "D"	77,050	88,607	62,415	847,000	926,395	680,879
Total Sales	$352,850	$421,877	$293,885	$3,965,000	$4,111,913	$3,276,410
COST OF SALES	$279,200	$331,057	$234,364	$3,188,100	$3,298,801	$2,593,664
GROSS PROFIT	73,650	90,820	59,521	776,900	813,112	682,746
Ratio to Sales*	20.9%	21.5%	20.2%	19.6%	19.8%	20.8%
EXPENSES						
Selling:						
Payroll	5,250	5,375	4,107	51,100	52,612	40,690

*Statement is footnoted with product line gross profit ratio detail.

EXHIBIT 11

Our Experience Has Shown the Advantages

We fully realize that a monthly analysis such as ours, can only "touch the surface." However, the phases analyzed but briefly in each report frequently raise further questions from a member of top management (or the financial division) which lead to a detailed special analysis of a particular segment of operations. Our experience during the short three years of this type of effort to supply management with information, truthfully leads us to say, "Yes, monthly analytical reports are a real aid to management in small companies too!!"

Maintenance By Call Or Contract For Office Equipment

by K. K. Knutzen*

FOUR YEARS AGO our company had annual maintenance contracts for all of its typewriters, adding machines, calculators and dictating machines. This had been our policy for a period of years and the cost of these contracts was growing into a sizable annual expense. It was decided to make a comparison of the cost of individual service calls with those of annual maintenance contracts. As an initial step, we cancelled the maintenance contracts on all of our manual typewriters. We kept a record of the cost of service calls for the following year and found that, instead of paying $437.50 for maintenance contracts, our expenses amounted $105.00.

Each year, as we prepare our budgets, we review the records of various pieces of equipment with respect to service problems and determine whether or not we feel it advisable to continue annual maintenance contracts for those pieces of equipment. It is our company policy to carry a maintenance contract in instances in which we have a single item in use, particularly the first year it is installed. For example, if we purchase a new model or new type of duplicating machine, we feel it worthwhile to have a maintenance contract at least for the period of time over which the personnel using the equipment becomes thoroughly acquainted with it. This lets us know what problems or difficulties we might encounter if the maintenance contract were to be cancelled.

Our annual maintenance contracts are budgeted against the general administrative budget responsibility of the controller. Whenever we change from annual maintenance contracts to the expense of individual service calls, we transfer the budget item to the responsibility of the department head in the department where the piece of equipment is located. At that time, we also set our budget standard at the amount the maintenance contract would be. Our experience has been that a direct saving, as compared with this budget standard, is shown at the end of the year.

If we were to carry maintenance contracts on all of the equipment we had in 1957, it would cost our company $1,988 for 1958. On this equipment, we experienced expenses in connection with service costs during 1957 in the total amount of approximately $750.

* With Chiksan Company, Brea, California.

Stores Economy Through "Free Access" Materials

by HARRY CLARK

WHAT DO WE MEAN BY THE TERM "FREE ACCESS MATERIALS"? Do we mean that we have removed the locks from the storeroom doors? Do we mean that the public is invited to come to town and help themselves? Free access to whom? Do we mean that free access materials are not subject to control or to the scrutiny of the inventory accountants or to management? Let us examine the term in this context. "Free" stresses the absence of external compulsion or determination, rather than the absence of all restraint. The noun "access" is defined as an approach, an admittance or admission, and accessibility. It is, therefore, apparent that a most liberal interpretation would mean that the materials are not under lock, are available to anyone, and may be taken without charge.

Do we have any such material? The answer is a qualified, "Yes." Almost every company and every department of each company will have a great number of items that are readily available to employees without a signed requisition. For example, the company garage may have such items as cotter pins, rivets, screws, washers, valve caps, lock washers, greases, etc. These items have all been charged out to expense at the time of recording the vendor's invoice. Another type of free access material is that which we at Portland General Electric Company call "truck stock." This stock was originally loaded on the service rig or line truck when the truck was placed in service and the material was charged from stores to predetermined accounts. The stock consists of connectors, fuses, service wire, service knobs, some guy wire, a few cross-arms, and all the miscellaneous accretions made by the line foreman or rig driver. The truck stock is replenished by requisitions on storeroom stock from time to time, and such replenishments are charged to the accounts appropriate for the use as reported by the foreman.

Why have most utilities adopted the two procedures outlined here, that is, "charged out materials" and "truck stock"? Is it because the storespeople cannot keep track of all the minor items? Or is it because the inventory accountants do not like to count such minor items? Both of these questions could be

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HARRY CLARK, Portland Chapter, 1949, is Auditor of the Portland General Electric Company. He has been associated with this company for 23 years, progressively advancing to his present position. Mr. Clark is Past President of Portland Chapter.

answered in the affirmative, but we have not gone far enough. An investor-owned regulated electric utility must have a management and workers who are always seeking more economical and efficient methods of operation. This is true not only of construction methods and maintenance work but also of accounting and business practice methods. The very nature of our enterprise, the number of customers, the regulations and growth impose a vast amount of record-keeping and paper-work. In addition, we have the normal problems of the business world and, like other industries, we are faced with rising operating costs due to inflationary trends. Squeezed between these, on one hand, and reluctance of regulatory commissions to allow needed price increases on the other, cost reduction practices are absolutely necessary.

The Costliness of Full Detail

Let us look at a normal materials and supplies inventory of an electric utility and the record-keeping involved. Most electric utilities stock materials for a construction program as well as for maintenance work. We are talking, therefore, about an inventory of several thousand items having a unit cost of from five cents to thousands of dollars. In general, all items are controlled on perpetual inventory records for quantity and dollar amounts and are issued only on approved stores requisitions which must be priced, extended, totalled, credited to the stock account and charged to a construction work order estimate account or to the appropriate maintenance account. The clerical effort for processing a stores requisition is the same for five-cent lag screws, five-cent square washers or one-hundred dollar poles. Consider for instance, a handful of line hardware items that represent twenty or thirty pieces and a total cost of approximately $3.50. How much would it cost to record and account for these items if they were issued separately, considering that an individual issue ticket has to be prepared and a tabulating card has to be punched, priced and machine processed? We have estimated that the processing costs for these small items would be about the same as the materials required to build a mile of distribution line consisting of 24 poles, 24 cross-arms, 16,000 feet of No. 2 copper wire, 10 fifty-foot triplex service drops, nearly all insulators, and related hardware.

Cutting Down on the Record-Keeping

This was enough to convince us that it would be foolish to continue issuing and processing small-cost repetitive quantities in the old manner. We therefore eliminated requisitions for these items, eliminated the posting and processing

of individual items and have saved ourselves a lot of work. This, no doubt, sounds as though we have opened the storeroom doors, given away all the padlocks, and placed a placard for all to see which reads, "Linemen, welcome! Help yourselves! No records required!" Nothing is further from the truth. Our storerooms are still locked and the operating personnel are aware of no slackening or loosening of accounting controls used in material and supplies transactions.

What have we done and how did we go about it? In the fall of 1953, we analyzed approximately 75,000 individual pole line hardware material issues from and returns to stock. We found that the major portion of these issues was for about 125 small-cost items used on each and every distribution line job. These items were, for all practical purposes, always charged to the same plant account or the related maintenance account. We were able, through this analysis, to establish a standard accounting distribution for each stock item, to which we can charge bulk lots of pole-line hardware. In general the distribution was about 90 per cent to the respective plant accounts with about 10 percent to the related maintenance account.

Once the predetermined accounting distribution was established, we separated our supplies of pole-line hardware into a warehouse stock and a bin stock. A working stock of bin items was charged from the stores records by means of regular stores requisitions to the predetermined accounts. The items so charged were physically separated from other stocks and placed in bins which are marked with red code tags as bin stock. These then became free access material, inasmuch as the storekeepers would issue the required number of any items of this stock as indicated on a job sheet and would not require a stores requisition. Warehouse stock represented those items of bin stock which had not been charged out of stores. A standard unit of issue was established for each item. For example, line bolts were packaged in groups of 25 or 50 each, guy cable in coils of 500 feet, etc. A standard issue form, partly reproduced here (Exhibit 1), illustrates this procedure. An item of ⅝" x 12" machine bolts might be charged out

SCHEDULE OF BIN STOCK ITEMS SHOWING STANDARD UNITS AND ACCOUNTING DISTRIBUTION FOR REPLENISHMENT

Stock Code No.	Description	Standard Unit	Quantity Distribution of Standard Unit							
			Blanket Job 354	768-13	Blanket Job 355	768-23	Blanket Job 358	770	Blanket Job 359-1	771-13
1-10-818	5/8" x 18" DA Bolts	25	22	3						
1-10-828	5/8" x 28" DA Bolts	25	22	3						
1-10-822	5/8" x 22" DA Bolts	25	22	3						
1-16-470	PAC-4 Blackburn Clamps	100			10	5			80	5
1-16-475	A1 Clamps	100			10	5			80	5

EXHIBIT 1

in units of 50, with 43 being charged to the blanket construction work order estimate with plant Account No. 354, distribution poles and fixtures, and 7 being charged to the maintenance Account No. 768-1, maintenance of distribution poles and fixtures.

To replenish the bin stock items as they are issued, a stores requisition is requested by the storekeeper when he notes the bin is below operating requirements. This requisition records the transfer of warehouse stock to bin stock and is charged to the predetermined plant and maintenance accounts. This procedure accomplishes very well the accounting for minor material items on distribution jobs; however, special provisions have to be made on jobs of other types. In this category fall such jobs as customer billings for jobbing work and other work of a non-distribution nature. Stores requisitions are prepared as usual for the bin stock materials requested on such jobs. The procedures for processing such requisitions may vary from the normal in either of two ways.

The procedure used in the largest storerooms, where quantity stock cards are maintained, was adopted to fit the requirements of the operating and stores personnel in those locations. The stores requisitions for bin stock material used on special jobs are posted to a bin stock material sheet. Periodically, this sheet is recapitulated manually by item and account and posted to the stock cards, although actually issued from bin stock. When bin stock is to be replenished, the special items on the bin stock material sheet are charged on the replenishing requisition to the special accounts and the remainder of the standard unit is charged to the predetermined accounts. For example, distribution of a standard unit of 50⅜" x 12" machine bolts might then be:

6 to Account No. 352—Distribution substation equipment
4 to Account No. 145-1—Jobbing accounts
34 to Account No. 354—Distribution poles and fixtures
6 to Account No. 768-1—Maintenance of poles and fixtures

In the other eight storerooms, the requisitions for bin stock materials used on special jobs are stamped "special" and are processed independently of the regular stores requisitions. Individual material issue cards are punched for these items and, as a result, the special jobs are properly charged with the actual material costs. At the end of the monthly accounting period, these charges are summarized and a journal entry is prepared which credits back the accounts charged through the predetermined accounts for bin stock issues.

Rather unique is the simplified method of accounting for bin stock material returned to the storeroom. Formerly, all such material was checked against a returned-to-stock ticket. Now all usable bin stock material is returned directly to the bins without a stores record entry. If the bin becomes overloaded, the store-

keeper simply prepares a bundle of the particular item in the number considered as a unit of issue and then requests a returned-to-stock ticket which records the transfer from bin stock to warehouse stock and credits the bin stock accounts previously charged. In some instances, where there are about the same number of returns to stock as there are issues of a certain item, considerable time will pass before a stores accounting entry is required.

Practices of Other Companies

Other utilities in California have adopted plans for free access materials differing somewhat from ours. Units of property when issued from stock and charged to plants are "loaded" with a percentage to cover the small-cost repetitive issue items. Both underground electric systems and natural gas systems use this method. One company, for example, has included all pole line hardware items in a single code called "line hardware" which is charged out in pounds. This reduces the accounting and record-keeping to a bare minimum.

In still another company, the stock of materials and supplies has been divided into three parts called "A," "B," and "C" materials. The "A"-stock is composed of items of considerable cost and of considerable importance to a construction program. These items, representing about 5 per cent of the total stores items, are posted individually in the stock records and such records of inventory, movement, supply and schedule are watched very carefully. The "B" stock, representing about 40 per cent of the total items, is composed of the mid-way items—neither absolutely essential to a continuing program but capable of substitution and of more or less medium cost. These items are recorded when purchased and issued but are not received continuously, as are Class "A" items. A sixty-day supply of Class "B" items is considered normal stock. The class "C" items represent about 50 per cent of the total items but only 5 per cent of the inventory and are not recorded in the records as issued and purchased, except in total dollars. As purchased, they are charged to a dummy stores account and each month an estimated issue, based upon past experience, is prepared charging the dollar amount to predetermined accounts. At the end of the year, an inventory is taken to verify the reasonableness of the charges or issues and, if necessary, the predetermined distribution is adjusted for the following year.

Accomplishments — And Possible Extensions of the Concept

To summarize, the following methods are being used to avoid a vast amount of record keeping for small-cost items by electric utilities. Such materials may be:

1. Charged to expense or capital when purchased.
2. Issued as truck stock in relatively small quantities from regular stores stock.
3. Charged to bin stock as in our described procedure.
4. Combined in groups into one code and treated as a single composite item.

Whatever the method, the result is the same—increased efficiency through reduced paper work and channelling of clerical effort to more productive tasks. Briefly, our new system accomplished the following:

1. Lines of writitng on our stores requisitions have been decreased by 33 1/3 per cent, allowing clerical employees to devote about 275 to 300 man-hours per month to more productive work.
2. Tabulating issue cards have decreased by 8,000 to 10,000 per month, resulting in a reduction of 40 hours of key-punch time per month. Likewise, tabulating machine time has been reduced by eight to ten hours per month.
3. The bin stock is not inventoried at the time of a physical count, inasmuch as it is already charged out, thus saving hours of expensive labor counting thousands of small-cost items.

We have thus reduced clerical costs of processing source documents, reduced the volume of papers processed, and retained the required accounting control.

Our list of bin stock items may be expanded or contracted as conditions change, and our predetermined accounting distribution may be changed as our operations change, based on periodic studies.

Have we gone far enough in any of the systems mentioned here? Could we, as one utility has suggested, eliminate stores requisitions and stock control records for individual items and issue material to line crews with no records? This utility would charge all materials and supplies to a single account and use monthly or annual credits, based on an inventory of the work performed, to reduce the book value of the stock. Annual inventories would be taken to adjust the stores values to physical count. The suggestion might startle some of us, but it is an indication that the subject of free access materials has not yet been exhausted. We still have a broad field for study and many interesting changes may develop in our present methods.

Daily Profit Estimates Are Practicable

by D. L. WILSON

MANAGEMENT PEOPLE constantly request that they be informed how profitable or unprofitable business operations have been for a given period. The sooner this information is available after the period in question the better. Controllers and their accounting staffs are well aware of this fact, as shown by the overtime they spend during the last few days of a period and on through approximately the tenth working day or more of the following period. Despite all the accounting knowledge, systems and procedure methods, and mechanical improvements at our command, formal closing of the books and preparation of profit and loss statements still take considerable time. The all-important results that management has been waiting for have been withheld for approximately ten working days or longer. This is much too late in this age of jet airplanes and other speed devices for one to be proud of such a presentation as far as timing is concerned.

Immediate results at the close of the accounting period are the Utopia management is looking for. Some companies get statements to management on the first day of the following month. However, this has been accomplished by cutting off certain journals an agreed number of days prior to the end of the month so that the mechanics of closing the books can be performed. In my opinion, management just gets old information at an "early" date. Usually, the intervening time element remains the same.

I would like to present the results of some experience with the preparation of daily estimated profit and loss statements which can be prepared by accountants for the guidance of management. The technique used depends on good judgment of the accountant through an intimate knowledge of the business, a study of trends, and a consideration of budgets, if available. Such statements, while not precisely accurate, will not vary too much from the actual results if some thought has been put into the technique of calculating the information. One needs only to reflect on the extent to which estimates are already a part of current accounting practices. We all know that, in some instances, the estimates are exceedingly accurate while others are a little further from our aspirations.

DAVID L. WILSON (Baltimore Chapter, 1951), is budget manager of McCormick & Co., Inc. He joined this company in 1949 as Supervisor of the Accounting and Cost Departments. Mr. Wilson was named to his present position in 1955.

History and Operations of the Company

It would be well to acquaint the reader briefly with McCormick & Company, Inc. The company was founded in 1889 and engaged in the manufacture and sales of spices and extracts. It has grown through the years under hardships, depressions, and wars until it has become the largest spice and extract company in the world. A great contribution was made to the growth of the company by the introduction of "multiple management" in 1932.

There are two manufacturing plants. One is located in Baltimore, Maryland and the other in San Francisco, California. The latter was obtained in 1947 through the acquisition of an old and famous spice and coffee company—A. Schilling & Company, Inc. The McCormick Division products are sold in the East as far as the Mississippi River and the Schilling Division products are sold from there throughout the West.

The two divisions operate independently. Sales and manufacturing problems are coordinated for similarity in programs and procedures as much as possible. The bulk of our business is in the grocery products category, but we also have a growing institutional division which serves hotels, restaurants, and industrial feeders. In addition, there is an export division which sells to foreign countries in both the Western Hemisphere and Europe. Therefore, our imports are from the wide world and our distribution is world-wide. In our fiscal year 1957 our sales were over $36,000,000.

Source Data for the Daily Statement

A summary of sales is prepared daily and posted to a report which is maintained for management on a daily and cumulative basis. This practice, no doubt, is similar to reports prepared by many companies. It is from this report that a daily profit and loss statement is possible. In fact, we are now using this technique for one of the divisions of our company. Management receives only a part of the story when sales alone are reported daily and other information for the profit and loss statement—cost of sales, expenses and miscellaneous income—are not presented, even on an estimated basis, to show what the sales represented by way of a profit or loss.

Our daily sales totals are obtained manually without benefit of knowing how much spices, extracts, tea, coffee, etc. were actually sold. They are not recapitulated by product lines. Although this information is available from the tabulating cards which are used to prepare customer invoices and the monthly sales analysis by product, we have not found it necessary or important enough for the tabulating department to prepare such a detail breakdown on a daily

basis. For our purposes, total sales has been sufficient up to this time. It is very possible that some companies would need a product breakdown in order to properly estimate daily gross profits, when a wide variation in gross profit percentage exists among products. Since we calculate percentages of gross profit, expenses and actual profit on a net sales basis, it is necessary to estimate the amount of percentage of cash discounts, returns and allowances, etc. to subtract from the reported gross sales. For this purpose, I have found historical data to be adequate, coupled with any knowledge of a change of discount policy.

The next important consideration for the daily profit and loss statement is the calculation of gross profit. In some companies, as previously mentioned, the sales mix would be necessary to obtain gross profit reliably. If this were necessary and in order not to clutter up the daily profit and loss statement, supporting schedules could be prepared for calculating the gross profits by individual product line. On an over-all basis, we know historically the percentage of gross profit, what trend it has been following, whether or not there has been an increase or decrease in selling prices, whether or not the costs of raw materials have gone up or down, what significant changes in labor or overhead rates have taken place, etc. After due consideration of these problems and all other factors peculiar to the business, a reasonable estimate of the per cent of gross profit can be determined for calculating the estimated gross profit.

The next consideration is the estimate of expenses by major classification, consistent with the company's requirements. Regardless of the various categories of expense, they fall into two types with respect to method of obtaining these figures on a daily basis. First, there are those expenses which are posted to the general ledger by journal entries and, second, those that are posted through vouchers payable. The former present a problem of handling. Usually, journal entries are posted at the month-end or very soon after the month-end. On the other hand, many accountants post such entries during the early part of the month to alleviate the pressure at month-end. Such expenses may or may not vary much from month to month. If they do not, then it is quite possible to determine a figure for the "fixed expenses" or, more accurately described in this case, "expenses from journal entries." (It is, of course, recognized that what may be posted from journal entries by one company will be posted from vouchers in another company.) Many of these monthly journal entries are based on annual estimates divided by twelve. Consideration can be given to calculating daily averages of these estimates on the basis of selling days and prorating to each month its share, based on the selling days in each month related to the over-all total.

DAILY ESTIMATED INCOME AND EXPENSES

	Days (20 selling days)	Gross Sales Budget	Gross Sales Actual	Net Sales	Gross Profit	EXPENSES Rec., Ship. & Whse.	Freight	Selling	Sales Promotion	Adver-tising	Admin-istrative	TOTAL	Operating Profit
BUDGET		600,000		576,000	116,000-20%	11,480-2%	17,100-3%	22,800-4%	5,700-1%	17,100-3%	11,400-2%	85,580-15%	28,500-5%
Date													
1st	Sept. 3	30,000	25,200					300		500	100		
	F*							900			500		
		30,000	25,200	23,940	4,790	480	720	1,200		500	480	3,380	1,490
2nd			31,600					500		700	-		
	F							900			300		
		60,000	56,800	53,960	10,790	1,080	1,620	2,600		1,200	700	7,200	3,590

* Fixed expenses or expenses from Journal Entries

EXHIBIT 1

Form and Content of the Statement

Exhibit 1, Daily Estimated Income and Expenses, illustrates the form presently being used for one division of the company. The manager of this division looks forward to the daily posting, for now he is constantly abreast of the progress being made. He knows whether he should concentrate on getting more sales or whether his expenses are getting out of hand, long before the month is ended. Since we use budgets, the monthly budget has been entered on the top line to indicate the performance expected. In practice, these figures are written in color (green) to call attention to the fact that they are budget figures. The daily figures are entered in black pencil and the cumulative totals are entered in blue. This is done so that the blue totals will serve to identify cumulative figures at once. It is possible that other techniques could be devised to assist in the clarity of presentation. The following paragraphs will review the expense columns.

In the illustration, it is assumed that receiving, shipping and warehouse expenses are directly tied in with sales and have been calculated each day at 2 per cent. Each company must decide how it can best estimate these expenses from the conditions peculiar to its accounting operations and the problems involved in obtaining such estimates. The degree of accuracy desired will dictate whether a flat percentage is sufficient or a more elaborate system of developing these estimates is necessary. As to freight,

it is again assumed in the illustration that this expense has a definite percentage relationship to sales. Where sales are of relatively the same mix from month to month and the same approximate weights are shipped into the same territories at the same freight rates, it is practical to use a fixed percentage. However, the problem must be analyzed by each company. In a company the sales of which are made within a 200 mile radius during one season of the year and mostly outside of a 1,000 mile radius at another period of the year, it would be necessary to use two different percentages, depending upon the season of the year.

The daily figures for selling expenses come from two sources. First, there are the daily "fixed expenses" or "expenses from journal entries," previously described. Second, there are the expenses paid daily by check or accrued through a vouchers payable system. Naturally, the more desirable method of collecting the latter would be from the vouchers payable system in which they are accrued daily. Sales promotion expenses come next. The daily figures for this type of expense, as illustrated, come from the daily recapitulation of the vouchers payable. It has been assumed in the illustration, for the sake of simplicity, that advertising expenses are also collected from the recapitulation of the accrued vouchers payable.

Referring to the illustration, one can see that the daily estimates for administrative expenses have come from the two sources already set forth.

Tabulating the Expense Totals Daily

Our accounting system makes use of punch cards for the preparation of the trial balance of the general ledger. Since these punched cards must be proved daily to a predetermined total, it is also possible, after the proof, to have them sorted daily by major expense category and totaled by the tabulating equipment. Therefore, within minutes after each daily proof, the totals of the "actual" expenses are available. Many companies do not use tabulating equipment but post to the general ledger with one of the many bookkeeping machines. Nevertheless, it certainly seems possible that daily totals by expense categories can be obtained through a little planning and that the results should not take too long to recapitulate.

How The Daily Statement Develops the Picture

A further use of the illustrated estimated daily profit and loss statement is that of budgetary control. On the top line of the illustrated form appears the budget for the month. This is the anticipated goal that has been reviewed and approved by management as being attainable. This daily profit and loss record

makes it possible to determine throughout the month how sales are progressing and, after a given number of selling days, whether a department's expenses are below or in excess of budget. It is not too late then to take corrective action to convert a situation that seems to be getting out of hand. When it is necessary to wait for the formal presentation of the monthly profit and loss statement, which is approximately the middle of the following accounting period, it is usually too late to correct what has been done. Therefore, management, through use of the estimated daily profit and loss statement, is constantly in touch with the situation and knows, within a reasonable degree of error, whether or not the company is operating from day to day at a profit or loss.

Constructing and Using a Flexible Budget For Manufacturing Cost Control

by VICTOR SCHMIDT

BUDGETARY CONTROL IS A TOOL OF MANAGEMENT used to plan, carry out, and control the operation of a business. It establishes predetermined objectives and provides the basis for measuring performance against these objectives. It enables a business to determine the need for modification of its plans without waiting until financial statements are prepared, when it is often too late to take advantage of the knowledge to alter the company's position for the period in question.

The Products of Budgeting

Budgets are individual objectives of a cost center, department, plant, product and company, whereas budgeting process may be said to be the act of building budgets or putting well-conceived plans on paper. Budgetary control embraces all of this and, in addition, includes the technique of planning the budgets, themselves, and the utilization of such budgets to effect an overall management tool for planning and control. Budgetary control provides for comparisons of current performance with predetermined goals. Every business, regardless of whether it is using budgetary control or not, makes some attempt to compare current results with either budgets or records of the prior period. Where budgetary control has not been installed, the only comparative figures usually available are those showing the results of some prior period's operation.

The several budgets, such as manufacturing expense, sales, sales expense, general and administrative expense, etc., have to be consolidated to arrive at a total company budget for presentation to the board of directors. This paper will dwell primarily on the manufacturing expense budget and will explain the steps followed in developing such a budget. The flexible manufacturing budget is used to develop machine hour rates or other adequate media which will effectively permit us to cost our products on a factual equitable basis. Budget planning emphasizes the best manner for the collection and allocation of costs to promote interest in and action on expenses by supervisory personnel.

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Steps To Be Followed in Completing Manufacturing Cost Budgets

The steps followed in setting manufacturing budgets are:

1. Establishment of the cost centers within the plant.
2. Determination of departmental responsibility.
3. Adoption of a unit of measurement which is most equitable for the department, whether it be standard machine hours, standard labor hours, tons shipped, or another unit.
4. Planning normal activity.
5. Amount of expense to be budgeted.
6. Distribution of service and general plant centers to develop machine hour rates.
7. Final development of machine hour rates for product costing.

The most practical method for allocating, collecting, and controlling costs of direct labor and expense is the use of the cost center as the basic unit to be costed. A cost center usually embraces like and homogenous activities, and functions under the definite authority and responsibility of one supervisor and his assistants. Quite often, it is convenient for control of expenses or convenience of operations to have two or more cost centers placed under the charge of one supervisor. This constitutes a department. There are a number of additional reasons for using cost centers. They may be set up to determine the standard cost rates for the expense, including direct labor, for a specific class of operation, to establish specific operating budget allowances geared to any volume of activity and to provide definite supervisory responsibility for such budgets, to provide a place and means of disclosing the variances between the standard cost allowances and the actual expenditures made, to determine the standard cost of a given operation and to fit it into the standard cost of the units of product made and to furnish the means of clearing expense and of determining the recovery of standard labor and expense cost. Care should be exercised in the determination of cost centers. No more than are absolutely necessary should be developed. False accuracy is costly and confusing.

The cost centers are grouped together under specific supervisors and are segregated into production centers, service centers, and general plant centers. The production centers are primarily concerned with the production of product and the service centers are those which have no direct product activity within their scope. (Each service center has a separate budget allowance which is adjusted according to the quantity of standard units of production which pass through the production cost centers it serves). When this grouping is completed,

the plant will have been separated both into an organization pattern and into a cost center routing for product costing and expense control.

It is now necessary to determine the directly controllable expense applicable to each of the cost centers. In the productive centers, only those expenses are budgeted which are directly applicable to the products passing through them and which are also directly controllable by the supervisor in charge. Usually, the expenses to consider in a cost center, as direct department expenses, are direct labor, indirect labor, salaries, operating supplies, maintenance labor and overhead, maintenance material, etc. In the service type of cost center, the same general rules are followed but, naturally, the type of expense will vary with activities involved. In the general plant cost centers, there are such expenses as depreciation, taxes, insurance, etc. These expenses are often largely fixed in nature and, to that extent, not controllable by department supervision.

The next step is to decide upon the proper denominator or denominators for each of the production centers, so that all the different units produced can be related to a practical basis of measurement reflecting relative cost and, thus, can be placed on a comparative basis for evaluation of performances in their production. Common denominators such as man or machine hour requirements, pounds produced, direct labor dollars, etc., are often used, but care must be taken to select the one best suited to each situation.

It now becomes necessary to determine the activity level to be used to recover the budgeted cost for each of the centers. At this stage of preparing the manufacturing budgets, a meeting with top management is in order to determine the normal activity to be used in the development of the cost rates. Determining and using normal activities is of primary importance in our budgeting. Upon it rests the calculation of the standard cost of the products, the establishment of budgets, the schedules of operation, and the predetermination of the profit objectives. In establishing the normal activity of any segment of the company, our thinking must include both the physical capacity of the plant and the average sales demand to be expected. Neither, considered alone, is sufficient. Our concept of normal activity is the utilization of physical plant necessary to meet the average long-range sales plan over a period of time long enough to level out the peaks which come with seasonal and cyclical variations.

Once the normal activity has been established for a particular machine or cost center, the amount of the expenses to be budgeted for this normal activity can be determined. The categories of expense involved have already been mentioned. It is also necessary to determine the expenses for service and general plant centers which will be necessary to maintain the plant at the normal activity. How many engineers do we need, how many accountants do we need, how

much will they cost us, how much will our depreciation, taxes, fringe benefits, etc. be? It is very important that each member of the manufacturing team participate in the establishment of the budget for his area, that the budget be fully explained, and that it clearly set forth the calculations to be made daily, weekly, or monthly in determining allowances for each item of expense.

It will now be apparent that the manufacturing budget, at least for control purposes, is pretty well completed. We know how much we expect to have to spend to operate at the normal activity budget. However, several clerical operations are still required to facilitate costing. It is still necessary to distribute the general plant and service centers back to producing centers so that the final machine hour or other suitable costing rate for each of the producing centers will absorb all of the cost at the activity level decided upon. For example, if we assume only one machine in the plant, which produces all products, we would want the machine hour rate which we have developed for it to absorb all of our expenses for running the plant. This is accomplished by the usual burden distribution methods and is completed annually to develop machine hour rates only. It serves no purpose for control of expenditures.

The manufacturing budget which we have explained is a flexible budget and each item of expense will be flexible in relation to the activity which generates the expense. In this way, allowances are given to manufacturing management on a work-done basis. It is then a simple matter to determine variances between actual expenditures and earned allowances and also the variances between the earned allowances and the amount recovered in our machine hour rates. Fixed and variable expenses for profit volume ratios are also determined and, in effect, the foundation for a direct cost installation has been prepared. The basic benchmark or manufacturing budget has now been established on a normal activity basis. We have not chosen between direct costing and the flexible budget. We have found a combination of the two—developing variable costs for control and total all-in costs for pricing concepts (with a clearly defined development of volume variance) more informative than either one.

Daily and Weekly Control Reporting Against the Budget

Moving from the yearly job of budgeting, which is the foundation stone for all the control reports throughout the year, to the day-to-day job of controlling costs with the aid of daily, weekly, and monthly performance reports, is like moving from plans to action. As accountants, we are sometimes inclined to treat the subject of daily performance reports rather lightly, as dry and uninspiring routine work, suitable only to be relegated to the newest, most inexperienced personnel of the department. I would like to stress the point that daily reports

of performance are one of the strongest tools of cost control service that management has at its disposal. Good daily and weekly reports give production superintendents the data they require to measure their own operating effectiveness promptly and accurately and are the base upon which we build all the summary control reports of manufacturing operations.

The system of daily and weekly reports to be briefly described here does not contain any built-in magic ingredients for cost control. It still demands considerable zeal on the part of the production superintendent to dig in and discover why a particular result was favorable or unfavorable. What we attempt to do is to provide production management with prompt reporting of performance in time for corrective measures. To accomplish this, a daily detailed record of machine activity and performance for each machine for each shift is developed. This can be called a daily machine log or daily performance report.

It is the basic instrument of labor variance control available to the production superintendent and his foremen. It is made available to him for his scrutiny early in the morning, usually before 9:00 a.m. Its purpose is to present to him, for the previous day, the actual production, the actual and earned machine hours, and the non-productive down-time for each machine for each shift. It is important to remember that the performances calculated on this daily report are based on information approved by the superintendent or foremen at budget time. Any of this information can be charted by shifts, by foremen, or by machines, to provide a more pictorial portrayal of trends in performance.

Although direct labor and machine performance can be controlled on a daily or shift basis, many of the expenses in the department or cost centers are budgeted and expensed on a period of time which is longer than a shift or a day. To provide production management with information to control these expenses, a weekly performance report is prepared, which is a summary of the direct labor reported on the daily performance reports and includes, in addition, indirect labor and other expenses which can be controlled on a period shorter than one month. By the same token, the more this performance data is calculated on a daily or weekly basis, the less clerical work is encountered at the end of the month. Normally, these weekly performance reports are charted, in order to provide the plant manager or superintendent with a bird's-eye view of the total plant or department performance.

That is the picture with regard to the daily and weekly reports used to make the flexible budget a dynamic instrument of cost control service. Because we are operating not only under a flexible budget but are flexible in ourselves, there are additional reports, prepared on a spot basis, to control specific items which we know require attention.

The Services of Monthly Operating Statements

The monthly operating statements are viewed as only a media to summarize the plant operations in an understandable way for closing the books and for relaying the information as a summary of operations to the department supervisor involved, and to the plant manager and his superiors. The good derived from any industrial accounting or budgeting system comes from the individual foremen and supervisors and the decisions they make in regard to the expenditures within their area on a day-to-day basis. The emphasis should be placed on furnishing pertinent information for control of expense in the hands of the person able to control the expenses, as quickly and as clearly as possible. Because we realize this, the objective of our system is to furnish accurate information to responsible parties as quickly as possible and to refrain from cluttering up this information with meaningless details and ambiguous information.

As has been mentioned before, the entire accounting process of re-distributing numerous charges on a monthly basis has been eliminated. The only time this is done is at budget time when the machine-hour rates for product costing are determined. Therefore, the arrangement of the individual budget allowances as to responsibility units forms the basis for the operating statements. These, in turn, report for each department and for the entire plant performance against the directly controllable expenses for each responsible unit. Because we have concentrated on the reporting of plant operations on a flexible budget basis, it is always possible to project an earned budgetary allowance for each expense by responsibility units, either daily, weekly, or in advance, as soon as the production schedule is known.

As all responsible units receive daily or weekly reports, it becomes necessary to summarize this performance in monthly ones, eliminating detail valuable on a daily basis to a foreman but not required by a busy plant manager, and yet to furnish the manager with enough information so that he can intelligently appraise his operations and report to his superiors. However, accountants are not employed to prepare history. If we cannot get reports out in time and in a form to be of value to production management, the entire accounting system loses its value to him. That is why the heart of this system is the control report to responsible units, furnished in time for corrective measures to be taken. In comparison to a daily report, only a small amount of active control can be exercised by the information in the monthly report. However, we can tell the plant manager how his plant operated during the month and where there is a need for his attention. And we must tell him this as soon after the facts as possible.

To keep the monthly operating statements to a minimum of detail, they con-

sist of a report for each department and a summary for the plant manager. Throughout these statements, we keep in mind that only information which is directly applicable to each of the superintendent's departments is to be shown on the department statement. No expense is reported over which the supervisor cannot exercise control. The information shown includes the earned allowances on a work-done basis, the expenditures which were made during the period of time, and the variance for each expense. Variations from standard or budget which are not directly controllable by the individual supervisors are reported separately as management data variances.

Normally, all of the general plant and service departments are grouped together on one statement for the convenience of the plant manager. The budgetary allowance for these departments is also on a flexible basis. As they are in existence for the primary purpose of service to production departments, no useful purpose is served by a monthly distribution of their expense back to producing departments on an estimated basis. We want to give operating personnel facts—not guesses. We take the view that we are reporting general plant expense to the plant manager as one department with a break down by type of work performed, even though we may be including several areas of supervision e.g., accounting, engineering.

Material Control Is Apart From the Budget

Our raw materials are not controlled by budgets but rather by specifications for each product and waste standards for each as it passes from operation to operation. The standard for the quantity of material required for any item is determined by engineering requirements, usually indicated by drawings or specifications and expressed as specifications, formula, standard layouts, etc. Scrap is not recognized as a deduction to determine the net quantity of material which remains in a finished product. The principle involved is that the standard quantity of material on any item is the quantity which must be purchased or requisitioned to produce it and any return from scrap is incidental and will be treated as a general reduction in cost. Deviations from specifications can then occur because of:

1. Price variance—when there is a difference between the price paid for a base material and the anticipated or standard price.
2. Substitution variance—when a material other than specified material is used.
3. Material usage variance—when a quantity other than specified quantity is used.

When controlling materials it is, again, extremely important to have prompt accurate reporting to responsible personnel. This can be done on a material or product basis, whichever applies and is desired, but should be done immediately after the fact, if possible. Variance from the expected or standard in-process losses is by manufacturing order in some instances and always by cost center and by cause.

The material controls depend upon good inventories, requisitions, production reporting, and intelligent accounting. The reports turned out by the accounting department are no better than the basic data reported. Hence, every effort has to be made to insure the accuracy of all reports so that confidence in the control information is maintained. Such things as inventory errors, misproduction, incorrect counts, etc., if allowed to influence material variances, tend to reduce management's confidence in the submitted figures.

The Budget Is the Way We Package Accounting Service

The foregoing paragraphs summarize, very briefly, our activities in developing and using manufacturing expense budgets. We budget everything and, tying into our sales and administrative expense budgets, arrive at a consolidated budgeted profit and loss statement, balance sheet, statement of funds, etc. We believe the control of expenditures requires a flexible budget, detailed to the point at which the control of the expense can be exercised. The degree of detail has no set limit, except that which will best give service to the proper functioning of the business.

Cycle Counts for Stores Inventories

by ALBERT L. MILLER

MANY FIRMS have inventory test count programs for their production and saleable material. The York Plant, Caterpillar Tractor Co., also has a test count program from which we obtain a representative, comprehensive and accurate check of all our general stores items in accordance with the following schedule which is based on turnover of inventory items and results in a test count equal to the value of the inventory of least once a year:

Type of stores	*Coverage cycle*	*Type of stores*	*Coverage cycle*
Manufacturing	1 year	Automotive	1 year
Maintenance	2 years	Machine repair	2 years

Counts When Stock Is Low

There is an art to test counting, reconciling and determining when such counts should be made in order to obtain the most good for the least possible cost. For example, more accurate counts can be made and reconciliation more readily effected if the inventory test count can take place when the on-hand supply of a particular item is low. Ordinarily, this count will take place just prior to restocking the storage area with material received from a vendor. When the material is received, the window man (referred to here as the counter) determines the bin location of the material and completes th. following information on an Indirect Material-Inventory Count Card (Exhibit 1).

1. Identification number.
2. Description.
3. Received on purchase order.
4. Bin location.
5. Unit of measure.

The count card is available in four colors, one of which is assigned to each inventory indentified above. The counter counts the material received and enters the quantity in the "quantity received-actual" space on the card. The quantity received as shown on the receiving report is then entered on the "quantity received per R. R." space on the card. Any discrepancy between the quanti-

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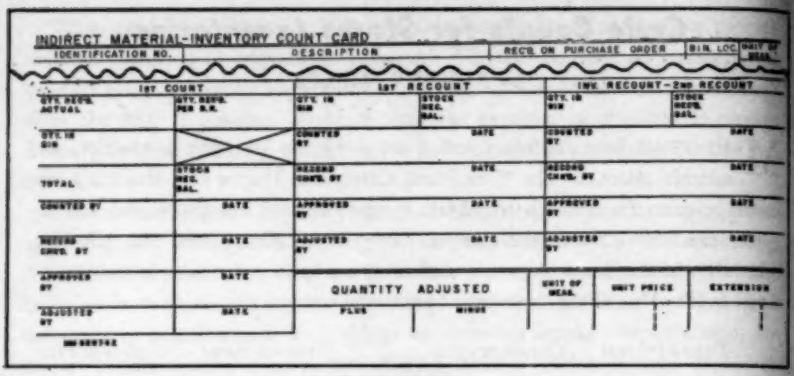
ALBERT L. MILLER, York Chapter, (Peoria, 1947) is Chief Accountant of the York Pennsylvania Plant, Caterpillar Tractor Company. He joined this company in 1946 and until being appointed to his present position in 1956, he had held various positions in the company's accounting departments. Mr. Miller is the immediate Past President of York Chapter.


INDIRECT MATERIAL—INVENTORY COUNT CARD

IDENTIFICATION NO. | DESCRIPTION | RECD. ON PURCHASE ORDER | BIN. LOC. | UNIT OF MEAS.

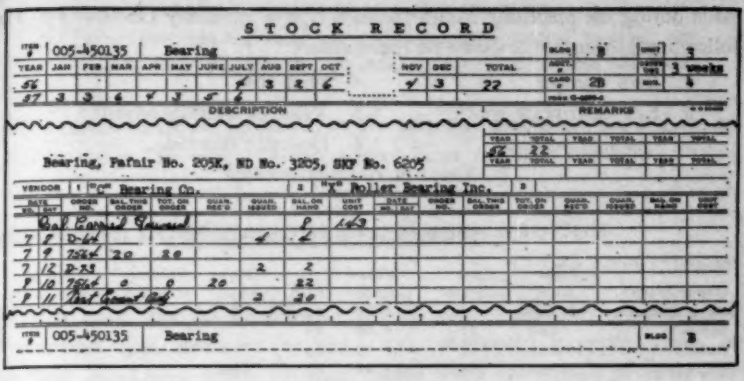
1ST COUNT		1ST RECOUNT		INV. RECOUNT—2nd RECOUNT	
QTY. RECD. ACTUAL	QTY. RECD. PER R.R.	QTY. IN BIN	STOCK REC. BAL.	QTY. IN BIN	STOCK RECD. BAL.
QTY. IN BIN		COUNTED BY	DATE	COUNTED BY	DATE
TOTAL	STOCK REC. BAL.	RECORD CHKD. BY	DATE	RECORD CHKD. BY	DATE
COUNTED BY	DATE	APPROVED BY	DATE	APPROVED BY	DATE
RECORD CHKD. BY	DATE	ADJUSTED BY	DATE	ADJUSTED BY	DATE
APPROVED BY	DATE	QUANTITY ADJUSTED		UNIT OF MEAS.	UNIT PRICE	EXTENSION
ADJUSTED BY	DATE	PLUS	MINUS			

EXHIBIT 1

ties shown on the receiving report and the actual quantity received is handled at a later date by inventory control personnel under a separate receipt discrepancy procedure which will not be discussed here. The material in the bin location is then counted by the counter and the quantity entered in the "quantity in bin" space on the card. The "counted by" and "date" spaces on the card are then completed by the counter and the material is moved to the proper bin location. Each day completed inventory counts cards are forwarded to the inventory control section, together with any material requisitions which were not forwarded prior to the time the test count was made.

Stock Record Check, Test Count Adjustment and Audit

Under receipt of an inventory count card and any material requisitions attached to it, the inventory control section posts the requisitions to the stock record (Exhibit 2), the balance from which is entered on the count card and the "records checked by" and "data" spaces on the card completed. When the inventory count quantity and the stock record card quantity agree, the stock record card adjustment quantity is shown as zero. If the inventory count and the stock record card do not agree, the inventory control section investigates to determine the reason for the difference. Any adjustment necessary to bring the inventory record into agreement with the count card is made and the amount is shown in the "plus or minus quantity adjusted" spaces on the count card. The "adjusted by" and "date" spaces are completed by the person determining the amount of adjustment. The count card is then forwarded to the inventory control supervisor and the production manager for approval and, following that, to the machine accounting section.


STOCK RECORD

ITEM 005-450135 Bearing

DESCRIPTION

Bearing, Fafnir No. 205K, ND No. 3205, SKF No. 6205

REMARKS

VENDOR 1 The Bearing Co. 2 New Roller Bearing Inc. 3

DATE	ORDER NO.	BAL. THIS ORDER	TOT. ON ORDER	QUAN. REC'D	QUAN. ISSUED	BAL. ON HAND	UNIT COST	DATE	ORDER NO.	BAL. THIS ORDER	TOT. ON ORDER	QUAN. REC'D	QUAN. ISSUED	BAL. ON HAND	UNIT COST
Bal Carried Forward						8	1.69								
7 8 D-64					4	4									
7 9 7564	20	20													
7 12 D-78					2	2									
7 10 7564	0	0	20			22									
7 11 Bal Carried Fwd					2	20									

ITEM 005-450135 Bearing

EXHIBIT 2

This section initiates an indirect material inventory count adjustment card and punches into it item number, quantity adjusted, unit of measure, and quantity counted. The unit standard cost of the item is next obtained from a master cost list and adjustment card is extended for the number of items adjusted and value of items counted, and is interpreted on the top edge to show the following information:

1. Item.
2. Quantity.
3. Unit of measure.
4. Unit cost.
5. Extended cost.
6. Quantity counted and value.

The inventory count cards and the inventory count adjustment cards, thus processed, are forwarded to the internal auditing section for review.

Upon receipt of the inventory test count and adjustment cards, the auditing section compares the quantity shown for physical count with the quantity shown for the stock record count and investigates differences it deems necessary, requesting recounts for differences which cannot be explained satisfactorily. Should a recount of a particular item be necessary, the applicable inventory count adjustment card must be removed from the deck and destroyed and the inventory count card returned to the inventory control section with the request that the particular item be recounted. The internal auditing section also observes the test count operation and makes any necessary recommendations. When it is satisfied, the cards are returned to the machine accounting section.

Test Count Summary

The machine accounting section prepares a summary of test counts and adjustments, in triplicate, at the end of each accounting month for test counts

made during the preceding month for each type of inventory (Exhibit 3). The following information is shown on the summary:

1. Item number.
2. Key description word.
3. Quantity adjusted.
4. Unit cost.
5. Value of quantity adjusted.
6. Quantity counted.
7. Value of quantity counted.

GENERAL STORES TEST COUNT

Description*	Unit Cost	Qty. Counted	Value Counted	u/m	Qty. Adj.	Value plus adj.	Value minus adj.
Potentiomete	4 750	1	4 75	03			
Screws	450	11	4 95	03			
Switch	16 000	2	32 00	03			
Tape	335	64	21 44	22	8CR		2 68
Brush	1 500	9	13 50	03	6	9 00	
Brush	1 500	27	40 50	03	1CR		1 50
Handle	950	7	6 65	03	1	95	
Pad	1 650	5	8 25	03			c/c
Soap	1 125	282	317 25	15			
Total c/c	c/c plus adj.	c/c minus adj.					
34	5	9	2357 77			30 30	27 14

*Complete form also has an "item no." column.

EXHIBIT 3

This shows totals of value of quantity adjusted and the value of quantity counted by inventory groups, and final totals for all groups are shown. The summary then is distributed. The orginal goes to the statements, costs and payables section, the duplicate to internal auditing, and the triplicate to inventory control. The statements, costs and payables section incorporates the current month's summary into a year-to-date summary schedule. The latter and the monthly summary then are forwarded to the chief accountant for review and decision as to whether adjustments to general ledger inventory accounts are to be made. If the summary is approved for adjustment to inventory accounts, the statements, costs and payables section prepares the journal entry, using the summary as the basis for and support of the entry. If an adjustment will not be made, the summary is filed.

The inventory count adjustment cards are filed by the machine accounting section and, at various intervals, they are matched with the master catalogue deck to determine which items have been counted and which items have not been counted. A separate listing is run of each group of items and is distributed as follows:

1. Items counted—Internal auditing section for review.
2. Items not counted—one copy to inventory control section, one copy to the applicable storage area, and one copy to internal auditing.

The copies which are forwarded to the inventory control section and the applicable storage area serve as notification of items still to be counted.

BREAK-EVEN COMPUTATIONS — USE WITH CAUTION

by Allan T. Steele*

IT HAS BEEN ARGUED by some accountants and statement analysts that the break-even point as computed or as graphically determined on a chart can be used directly as a means of making management decisions as to sales policies and their related production policies, or as a means of making decisions as to plant expansions, etc. It seems to the writer that this idea is subject to some qualifications and that the use of the break-even point in such a way should be considered very carefully.

The computation of the break-even point is based upon an equation which may be written out as follows: Sales at the break-even point, less variable expenses, less fixed expenses, equals zero (the break-even profit). One difficulty with such a computation becomes apparent immediately, e.g., the separation of expenses and costs into their fixed and variable components. Certain of the costs and expenses lend themselves readily to such a classification. For example, the cost of material used is definitely a variable cost and, conversely, property taxes on fixed assets are equally as easily classified as fixed expenses. Unfortunately, there are certain items, such as supervision labor, which may not clearly be classified as either variable or fixed costs.

The typical procedure in using semi-variable costs in break-even calculations is to assume that, since they vary somewhat even though not in exact proportion to production, they should be classified as variable costs. This produces an error in the computations, even though perhaps not always a material one. A second assumption in connection with these computations is that, once we have classified our costs and expenses into their fixed and variable groups, the variable costs will always remain in constant ratio to the sales within the limits of productive capacity of the company. This assumption is not necessarily true in all cases, since the semi-variable items will tend to change suddenly from time to time, rather than in a smooth continuous way, and these sharp fluct-

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uations will cause a change in the percentage relationship between sales and variable costs. Still a third assumption is that the fixed expenses have been properly computed and that they will remain within the productive limits of the company. Fallacies can be found in this assumption also. For example, depreciation which, under certain conditions would be classified as a fixed expense, is based on estimates of useful life and is, therefore, never an exact figure. Even the property tax amount, which we would almost automatically classify as a fixed expense, is often based on an estimate used in accruing taxes prior to the actual receipt of the tax bill for the period.

The break-even point, then, must always be looked on as an approximate figure, never an exact value. The question arises, "Can this computation be used in making management decisions?" The answer is "Yes" but not as a direct basis of decision-making unless used with extreme care and based on long experience in the particular company—and with full knowledge of its limitations. Nevertheless, this caution should not overlook the fact that the break-even point, like many ratio and percentage analyses, may be more freely used as a warning signal to indicate the need for further detailed investigation before embarking on new production or on the expansion of plant facilities. For example, when the break-even point has been carefully computed based upon a number of years results in the past and it is observed that the company's sales are declining toward the break-even point, management is definitely warned to investigate the causes of this decline. Or, if management is considering the production of new line or the expansion of facilities and careful estimates are made of the increased costs required by such changes, the break-even point computed based on such estimates can be used as a general indicator of what the results may be, should the contemplated changes be made. Management should remain very cautious, however, in accepting this indicator without further careful study of the situation.

In summary, break-even point computations may serve a useful purpose as warnings to management or as general indicators of the results which particular changes in the company's operations might produce. These signals or indications should be accepted with care and not as a direct positive answer to a problem.

Beyond These Covers

Books

Process Costs: Actual, Estimated, and Standard

George H. Newlove, Hemphill Bookstore, Austin, Texas, 1958, 288 pp. (8 x 10½) $5.

This text gives techniques for intermediate and graduate cost accounting courses in the five-year curriculum in management accounting, budgeting, industrial statistics, production management, and controllership. Recommended inventory valuation schedules are supplied which may be used under average cost, "fifo" or "lifo" pricing bases. Three methods of accounting for spoilage are illustrated in process cost, estimated cost, and standard cost systems when departmental costs are pyramided and when they are not. Problems are given for each chapter.

Intermediate Accounting

Arnold W. Johnson, Rinehart & Company, 232 Madison Ave., New York 16, N. Y., Second Edition, 1958, pp. $8.50.

It is a characteristic of this text that the word, "valuation" (which many accountants have had a tendency to exclude from their vocabulary as belonging to other lines of thinking) is regarded as having relevance at a number of junctures, especially the effect on income of various bases of accounting for assets and cost. A *closing* chapter is "Introduction to Accounting Theory." Some aspect of "actuarial science" are brought in by way of an appendix.

Current Trends in Corporate Insurance

American Management Association, 1515 Broadway, New York 36, N. Y., Paper Bound, 1958, 98 pp. $3.

A report of proceedings of last fall's AMA insurance conference, this grouping of papers includes coverage of a number of special areas, including casualty insurance and "insuring company aircraft." "Preparing for the Adjustment of a Major Fire Loss" treats of the main considerations involved.

Articles

The Nature of Management Accounting

Paul T. Crossman, Accounting Review, April 1958.

"Management accounting functions largely through operating reports based upon standard costs and budgets compared with actual expenditures, through internal auditing, and through special studies and reports pertaining to the probable effect of proposed plans and programs." This statement occurs near the end of the present article which gives earlier attention to these various aspects of management accounting.

Accounting Rediscovered

A. C. Littleton, Accounting Review, April 1958.

The historical background, theory, services, and structure of, and education for, accounting come in for reflection in this thoughtful article in which the development of "capital-income accounting" in medieval Italy is described as more basic to its nature than double-entry bookkeeping also developed then (and there).

The Impact of Automation on the Field of Accounting

C. L. Keeney, Accounting Review, April 1958.

Most of the matter here supplied by the vice-president of an office equipment manufacturer relates to use of such equipment in automation of retail sales transactions, but the accompanying comments are more broadly couched. A closing statement is that, "record-keeping is about to enter its period of greatest progress."

Twenty Years of Corporate Earnings

Sidney Cottle and Tate Whitman, Harvard Business Review, May-June 1958.

There are enough return on capital figures presented here—and figures for the components of profit margins and capital turnover-to test pretty thoroughly what the reader really thinks of the use of the return ratio for external evaluations of numerous companies and industries over an extended period of time.

An Accountant Looks at Statistics

Henry P. Hill, Journal of Accountancy, April 1958.

A Statistician Looks at Accounting

Herbert Arkin, Journal of Accountancy, April 1958.

These companion papers written from the viewpoints indicated by their titles explore the practicability of applications of sampling techniques to auditing. Mr. Hill suggests limitations and Dr. Arkin points out potentials. Both views seek to be "realistic."

A Case Study of Statistical Sampling

Raymond P. Obroch, Journal of Accountancy, March 1958.

Dramatic savings are reported in the instance described here in which a company made a portion of its inventory an experimental case for application of sampling techniques.

Hoover Commission Recommendations on Budgeting and Accounting

J. Harold Stewart, The Federal Accountant, March 1958.

The present article is the lead paper to a group of articles in the same issue of the *Federal Accountant* reporting talks given at a symposium entitled "Federal Accounting and Budgeting—A New Look" held last October. Other papers given include "Current Improvement in Federal Financial Management" by Percy Rappaport, "Financial Management in the Department of Defense" by Wilfred J. McNeil, and "Budgeting and Accounting Controls, City of Philadelphia" by Richard J. McConnell.

Accounting—Related to Social Institutions

L. J. Beninger, Accounting Research, January 1958.

Here set forth is a summary of (or, perhaps, some of) the teachings of D. R. Scott, an economist and accountant, whose interest in accounting was, in large part, for the place he saw for it in facilitating understanding of present-day society. Mr. Beninger's commentary is both expository and critical but, first of all, to call attention to Professor Scott's not-well known contributions, among them "The Cultural Significance of Accounts," a 1931 publication.

Production Waste—Its Nature and Accounting

Harold E. Paddock, The Accounting Review, January 1958.

Fourteen causes of waste are particularized in this article, followed by a discussion of the extent to which waste reporting is practical and of the development of waste reports, two of which are illustrated. "Cost of avoidable waste" is held to be information which it is the responsibility of the accounting department to provide.

Scientific Records Management

Arthur Barcan, Systems and Procedures, February 1958.

A vigorous brief article, this paper carries the author's conviction, supported by beliefs contributing to it, that a less inhibited approach is necessary to lowering records and procedures cost than is usually applied, even by those who believe they have achieved leverage on the problems involved.

Mathematics for Production Scheduling

Melvin Anschen et al, Harvard Business Review, March-April 1958.

As described in this article, "cost components" are identified as a preliminary to applying techniques, first, for obtaining a cost function for production and employment scheduling and then for arriving at "monthly decision rules" relating to the "aggregate rate of production" and the "size of the work force."

Addresses of Periodicals

Accounting Research

32 East 57th St., New York, N. Y., Single Copy, $1.25 plus postage.

Accounting Review

c/o R. Carson Cox, College of Commerce, Ohio State University, Columbus 10, Ohio, Single Copy, $1.50.

Federal Accountant

1323 L Street, N.W., Washington 25, D. C., Single Copy $1.25.

Harvard Business Review

Soldiers Field Station, Boston 63, Mass., Single Copy $2.

Journal of Accountancy

270 Madison Avenue, New York 16, N. Y., Single Copy 85¢.

Systems & Procedures

4463 Penobscot Bldg., Detroit, Michigan, Single Copy $1.50.